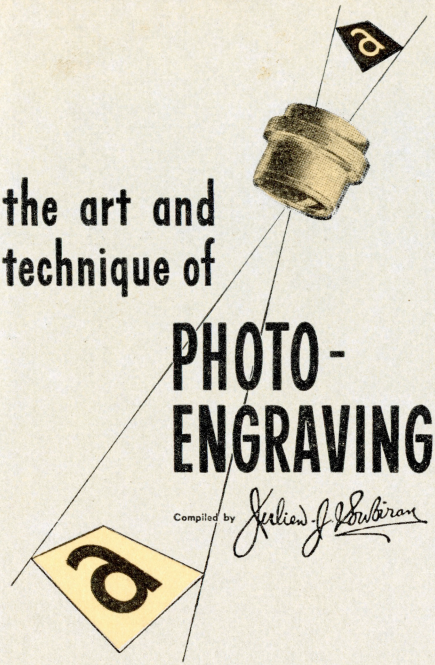
the art and technique of PHOTO-ENGRAVING



Compiled by Julius J. Sulzberger

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Compiled by Julien J. Sowbiran

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The author wishes to acknowledge the courtesy of Louis Flader, former Commissioner of the American Photo Engravers Association, who edited the excellent book, "Achievement", for permission to reproduce certain of the picture pages from that volume. Thanks is also given to the many friends and associates who supplied helpful information and contributed in many other ways to the preparation of this volume.

Julien J. Boubiran

Thanks to the photo-engraver, beauty sees itself at a single glance in a hundred thousand faithful mirrors—

—JEAN COCTEAU

VISION
LIGHT
PROGRESS

Photo-engraving extends vision. That in itself constitutes one of the greatest blessings conferred upon mankind.

Man's range of vision is extremely limited. At best he can see but little and that at no great distance. The most powerful telescope used at sea only enables him to visualize large objects a few miles away. The most powerful telescope used by astronomers only partly discloses the wonders of the firmament to one person. But when the telescope is made a part of the camera, it records whatever comes within its range and power of vision and photo-engraving reproduces it for the benefit of all the people.

Anything that can be visualized, be it on earth, in the heavens above or in the depths of the sea, can quickly be reproduced and brought to the masses.

As the telephone and radio extend sound, so does photo-engraving extend sight. As the automobile and the airplane reduce distance of travel, so does photo-engraving shorten distance — verily, it annihilates distance. Steamships, railroads, motor cars and airplanes take you to other parts of the world: photo-engraving brings all parts of the world to you and places them before your eyes so you may see.

That is the story of photo-engraving.

LOUIS FLADER
Former Editor
THE PHOTO-ENGRAVERS BULLETIN

One picture is worth ten thousand words.

AN ANCIENT PROVERB

FOREWORD

"Photoengraving is an interpretative art founded upon photomechanical processes enhanced by skill and artistry, which translate and convert tone value into relief printing surfaces, from which exact reproductions can be printed innumerable times."

The foregoing is an excellent technical definition of the "Art and Technique of Photoengraving." But photoengraving is more than an art or a technique when put to work.

It is a universally powerful visual force, transcending all language barriers — an essential means of communication. "One picture is worth 10,000 words." It helps influence minds to accept ideas. It sells products and services. It helps to train men and women just how to use appliances, automobiles, intricate machines and military equipment speedily. It makes excellently printed mass-circulation magazines the art galleries of democracy. As a poet, Jean Cocteau, has expressed it: "Thanks to the photoengraver, beauty sees itself at a single glance in a hundred thousand faithful mirrors"—yes, even in millions of mirrors.

Photoengraving is the handmaiden of progress — educationally, culturally, commercially. It tells *how* by picturing HOW. When wedded to the printing press, it is an important

visual aid, by which means its precise reproductions are multiplied for distribution. As Harry Groesbeck so well stated: "Printing plates and printing presses are like records and phonographs. Either is useless without the other, but in the graphic arts the combination plays to the eye, rather than to the ear."

Photoengraving, combined with letterpress printing, is so flexible a medium that one may reproduce—in small or large quantities—any design, chart, picture or other graphic form in line or tone, in black-and-white or color, and in endless combinations.

This available versatility calls for knowledge of what types of plate to use, singly or in combination, and how and when. The guiding mind must be trained to *select*, before the best use of the printed picture may be attained.

This short treatise on the "Art and Technique of Photoengraving" is intended to supply a general background and to guide buyers in the selection of the particular type of photoengraving or combination of several types that will best meet their visual needs.

W. Arthur Cole, *Managing Director*
Photoengravers Board of Trade
of New York, Inc.

CONTENTS

Acknowledgments v

Vision—Light—Progress vi

By Louis Flader

Foreword viii

By W. Arthur Cole

Introduction 1

The Story of Photo-Engraving 5

Steps in the Process

Step No. 1—Photographing 18

Steps No. 2 and 3—Stripping and Printing 22

Step No. 4—Zinc Etching 26

Step No. 4a—Copper Etching 30

Steps No. 5 and 6—Routing and Blocking 34

Steps No. 7 and 8—Finishing and Proofing 38

Color Plates 43

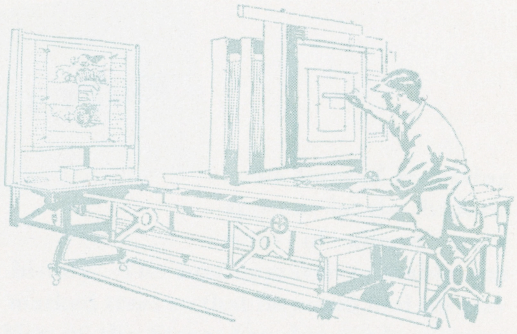
Various Types of Photo-Engraving 48

Duplicating Processes 52

The Three Processes 56

Preparation of Copy 58

Results to be Expected from Copy 61
Pointers 62
For Economy in Reproduction 64
Dont's 66
Departments of an Engraving Plant 68
Glossary 71
Index 97



Your story in picture leaves nothing untold.

—A.P.E.A.

INTRODUCTION

Some form of engraving appears in the historic ruins of almost every age in the world's history. The first engraver probably was the cave man, who marked trees so that he could find his way back to his cave. Men of the Stone Age dug crude pictures into the walls of their caves and on bone and ivory. Excavations in Spain disclose work estimated to have been done about 20,000 years ago.

Most steps in engraving evolved gradually—the engraving of Assyrian Seals, for example, occurred more than 4,000 years ago; the engraving of Greek coins, 3,000 years ago. It was nearly 2,000 years later, about 975 A.D., that the Chinese, having invented paper, developed the art of cutting wood blocks as a means of printing thereon. Armor-making Bavarians of the 15th Century used acid to etch beautiful designs on the battle armor of the warriors of that time. The use of acid in etching had been impractical until a resist could be discovered and it was in this period that such a resist was found. Thus they had found a satisfactory substitute for the burin and the graver.

The first photo-engraver was Joseph Nicephore Niepce, a Frenchman, who succeeded, about 1824, in obtaining a light-sensitive medium composed of asphaltum dissolved in oil. A film of this solution, poured on plates of metal and

dried, presented a substance which was so changed by the action of light that it became insoluble in oil. On exposing the sensitive plate to light passing through a transparent paper print the part, shielded by the print, remained soluble and, when washed away by solvent, the design showed up on the base metal. The undissolved film of asphaltum protected the plate sufficiently to be etched, thus producing an intaglio photo-engraving. A specimen of Niepce's early productions, an etching on a pewter plate made in 1825, has been preserved in the Niepce Museum at Chalon-sur-Saone, France.

Because Niepce could not keep his lines from fading, he associated himself with Louis J. M. Daguerre, who continued experiments after Niepce died in 1833.

However, it was Niepce's nephew, St. Victor de Niepce, who further developed and improved the method. About 1850 Victor found a way to remove the manipulative difficulties of his uncle's method, making the process of much more general application and more practically serviceable. He was also the discoverer of heliography, or the production of engraved steel plates by photography, reported to the French Academy of Arts and Sciences in 1853.

In 1852, an Englishman, W. H. Fox Talbot, made a printable plate by using bichromated gelatine on a polished copper plate and exposing the sensitized plate under a positive photograph. The gelatine hardened in the exposed parts and the etching solution ate through the softer parts to penetrate the copper in different depths. The plate then was placed in the press bed and printed.

His first expedient was re-exposing the bichromated film, before etching, under a piece of crepe, folded so that the threads crossed at an angle of 45 degrees. This produced a markedly different effect in his etchings and was actually a forerunner of the line screen of the present day. From his experimentation Talbot finally worked out a process of photo-

engraving in intaglio and obtained a patent for it in 1853.

Others experimented to approach a practical method of photo-engraving. First to use the word *halftone* were E. & J. Bullock in their patents, each based on the idea of using a ruled screen, "exhibiting halftones and graduated shades," with muslin or gauze net. There were several patents bearing on halftones up to 1883 but they required a negative from a positive in close contact with a screen, like Meisenbach or Bullock. By none of these early patents could a halftone be made.

The honor of creating the first practical halftone fell to Stephen Henry Horgan, an American photographer. His was the first halftone to be printed in a newspaper—a picture of "Shantytown" which appeared in the New York *Graphic* of March 4, 1880. Noting that the shadow in etchings of line drawings was merely the effect of fine lines close together, Horgan had Edward Bierstad draw many fine, vertical, parallel lines on a glass. He placed this between the photograph and a sensitized plate. The photograph was transferred to the plate, the lines breaking its solid tones into thousands of fine lines. The lines were thickest and darkest where the picture was black. His screen was the forerunner of the later Ives invention.

The Horgan improvements in halftone making, during the next fifteen years, spread the use of halftones to newspapers over the country. During this period Hoe was inventing, perfecting and building, fast, rotary newspaper presses and Horgan was developing his idea of printing halftones on presses using stereotype plates.

In 1893 Horgan failed to convince James Gordon Bennett of the New York *Herald* that his idea was practical. However, he had so improved his method by 1897 that he sold Whitelaw Reid, New York *Tribune* editor, on its possibilities. Thus, readers of that newspaper found in the middle of the front

page of January 21, 1897, a reproduction of a photograph of Thomas C. Platt from the first halftone ever printed on a highspeed web press using stereotype plates. It was the first step on the road to the present high development of photographic reproduction.

High honors came to Stephen Horgan for his pioneering work in photo-engraving before he died on August 30, 1941 at the age of 87. He was the guest of honor at a dinner in London, England, on March 4, 1930, in commemoration of the fiftieth anniversary of the first halftone.

In 1885, Frederick Ives, an engraver in Philadelphia, produced the first ruled screen and the Levy Brothers, Louis and Max, stabilized the industry by perfecting a machine that etched lines on highly polished glass. These lines then were filled with a black substance and the two pieces of glass were cemented together at right angles to each other. After they were bound together with metal the industry had the answer to the commercial production of halftones. The screen breaks down the many tones of black, in a drawing or photograph, into small dots enabling the printer to produce these tones on paper.

The STORY of PHOTO-ENGRAVING

Photo-Engraving is the art of photographically printing an acid resist on a metal plate and then etching the unprotected parts. The etched parts become lower than the protected parts, which remain in relief and become the printing surface of the plate.

Photography and the control of acids made possible the photo-engraving of today—an industry that employs thousands of skilled craftsmen. However, the individual experimenter had his place and William Gamble of London has put in a summation, "the beginnings of halftone," in this way: "Fox Talbot suggested the screen but not the halftone as we now understand it: Berchtold took the screen idea and applied it to a crude form of halftone engraving; Bullock, Swan, and Avet carried the idea further; Eggloffstein was no doubt inspired by Berchtold's patent; the brothers Kossuth got nearer to the right idea; Leggo's process was the first practical application because he was able to produce some good results and get them published in current publications; Horgan, equally practical, saw a little further than Leggo and got his halftones published in a daily newspaper; Ives was evidently inspired by earlier work by Woodbury and Petit and improved on their methods in an original way in his relief process; Meisenbach came in when all experimental work had been done for him, taking ideas already known, but not sufficiently worked, and made a commercial success of his

method. Not until Meisenbach led the way did the photo-engravers take up the halftone in earnest, and not until Max Levy had provided screens was the process placed on a proper basis."

Basically, the photo-engraving of the present day is either a line-etching or a halftone. There are eight steps in the process. These are: 1) *photography;* 2) *negative turning;* 3) *printing;* 4) *etching;* 5) *routing;* 6) *finishing;* 7) *proofing* and 8) *blocking.*

Line-etchings are reproductions on zinc and contain nothing but black or white. *Halftones* are usually made on copper, except for newspaper use, and contain any of the various tones of black, ranging from the merest suggestion of color to solid blacks.

If the subject to be reproduced is in lines or solid areas, such as a pen and ink drawing, a print from a wood engraving, a type page or anything printed on a typographic press, the *line-etching* process should be used.

If the subject is a photograph, a painting, a water-color, or a wash-drawing of any subject possessing gradations of tone, then the process to be used is *halftone.*

The range of screen is from 50 to 200 lines to the inch although some as fine as 400 to the inch have been made. The tendency is for newspapers to use from 50- to 65-line screen while engravings for catalogs and magazines are made in 110- to 150-line screen.

In black and white photography, the photo-engraver uses either *Wet Plate* or *Strip Film* (*dry plate*). Today the latter is being used to a large extent for both *line, halftone* and *color work.*

The first step in making a line-etching (commonly called a line-cut) is to obtain a *negative* of the subject to be reproduced. This negative is made to the required size by camera

manipulations and, after developing, is coated with collodion and rubber cement, which makes it pliable. It is lifted or *stripped* and *turned* from the glass used in photographing and placed on another piece of heavier, polished glass—a larger one which will hold numerous negatives. This glass is called a *flat*. If strip film is used, the application of collodion and rubber cement is unnecessary. Instead, a stripping cement is placed on the large glass flat to hold this film down.

Line-Etchings

Sheet zinc is usually used for line work and sheet copper for halftones. Both metals come highly polished and are standard 16 gauge. Zinc plates are coated with an albumen or cold enamel sensitizer and after such application, the plate is whirled and dried with heat. This sensitized metal plate is then placed in a vacuum frame, in direct contact with the negative side of the glass flat. The frame is locked and pressure is applied by creating a vacuum inside to bring about perfect contact. In this position the plate is exposed to a powerful arc lamp, the time of exposure varying according to the density of the negative.

The principle of *printing* on metal is different from that employed in the case of photographic paper. Bromide and chloride papers register light action, which changes color on development. It is not so in metal printing. Here the light action makes the sensitized surface insoluble in water, while the portions protected by the opacity of the negative will dissolve on development.

This exposed zinc plate is now removed from the frame and, *depending upon the sensitizer used*, either it is placed in a developing solution or a roller carrying a stiff printing ink is passed across its surface. It is then carefully developed with cotton under running water. The result is an image that can be treated to resist the corrosive action of nitric acid.

Slight heating dries the plate and it is dusted with an acid resist powder which adheres to the remaining image lines.

Now comes the actual *etching.* The back of the plate is coated with an acid-resist before it is placed in an electrically operated machine which contains a bath of nitric acid for the first etch. Electrically driven paddles in the machine splash acid on the plate. After a short *bite* the plate is removed, dried, and warmed before it is brushed from all four sides with a rosinous powder, known as *Dragon's Blood.* This builds up protection on the sides of the lines to prevent the acid from eating under the printing surface. A plate that is *undercut* often will collapse in the midst of a press run. With each application of Dragon's Blood powder, the plate is heated. This melts the rosin so that it adheres evenly. Then another bath of acid is splashed over the plate. Four repeats of this procedure usually produce the required depth.

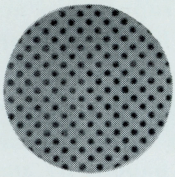
All plates require *routing.* This is a mechanical operation by which all surplus metal is removed from a printing plate. It is then passed on to a *finisher* who, by hand, removes any small imperfections resulting from the mechanical etching. *Proofs* are now taken of the plate and finally it is mounted on *blocking* wood so that it will be exactly the same height as type, .918 of an inch.

Halftones

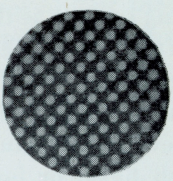
A halftone is just as the name implies, a plate containing different tones of black. The printing surface of a halftone is a series of minute dots and the size of that dot determines the amount of ink to be carried, thereby producing the varying shades of black. The dot is put on the negative by photographing through a halftone screen which is placed in the camera behind the lens but in front of the negative holder. Different types of paper and printing conditions determine how many dots should appear in a square inch. (*See page* 9).

COATED

Coated Paper Surface

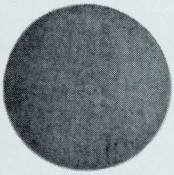


Highlight Dots

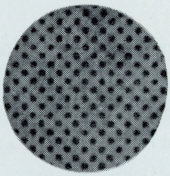


Shadow Dots

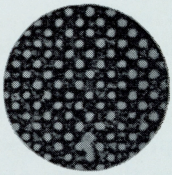
SUPER-CALENDERED



Super-calendered Surface

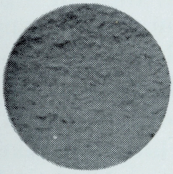


Highlight Dots

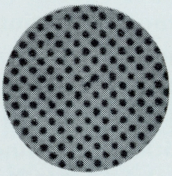


Shadow Dots

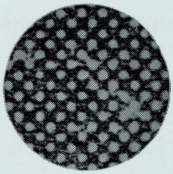
MACHINE FINISH



Machine-finished Surface

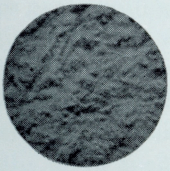


Highlight Dots

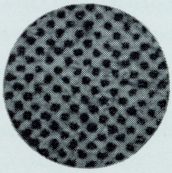


Shadow Dots

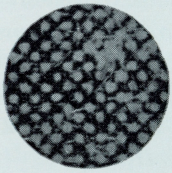
NEWSPRINT



Newsprint Surface



Highlight Dots



Shadow Dots

Newspaper printing, at extreme speed and on such a poor printing surface as that supplied by newsprint paper, requires a halftone with many less dots to the square inch than is required for a good enamel surface. Hence, many different screens are used. Those in general use are 50, 55, 60, and 65 for newspaper printing or on rough-surfaced papers. For English finish or bond papers, 85 and 100 screens are used, while 110, 120, 133, and 150 screens are used principally to make halftones for magazines and for fine printing on coated or enameled papers. The 175 and 200 screens are rarely used.

These photo-micrographs of printing-paper surfaces, on page 9, illustrate the importance, when making halftones, of choosing the proper screen. The circles show how halftone dots print on these corresponding surfaces. On the coated surface the dots are uniform in size, but note: as the paper surface becomes increasingly rough, the dots (highlights and shadows) are distorted more and more.

In halftones the negative is handled as in line-etchings—developed, stripped, turned, and printed on metal except that most of them are on *copper*. Mechanical etching is done in the same manner except that the acid used is iron perchloride.

The finisher plays a large part in producing a good halftone, just as he does with a good line-etching. He takes the plate, after mechanical etching has been completed, and continues the etching by hand until all the fine tonal values of the subject, photograph or drawing, are brought out in the plate. Many proofs are pulled in this operation stage so that the finisher can compare the plate results with the original. The plate, having been beveled and made absolutely square, is nailed on wood to make it type-high. Blocking wood generally is selected—kiln-dried cherry especially treated to prevent warping.

A dull appearing, smudgy impression from a halftone is

not always due to a lack of depth, because it is just possible that the press cylinder has been "over-packed," or the plate "over-underlaid," or the blocks have warped out of shape.

A PERFECT DOT

It has a flat top with tapered sides which have been etched clean and deep. A good dot structure means a good printing plate.

AN OVER-ETCHED DOT

It is a highlight dot that has been etched below the surface of the engraving. In the electrotyping process most of these dots are brought to the surface and their tonal value is intensified.

AN UNDERCUT DOT

An undercut dot produces a condition that prevents release of the mold in electrotyping and damages the structure of the dot. In such a case the engraving is usually remade.

ELECTROTYPES, under every conceivable test, always show a little less depth than the originals. Even the most carefully made nickeltypes show a loss of from two to four ten-thousandths of an inch by comparison with the originals.

As a protection alike to the public, the printer, and the

photo-engraver, it is important that all should know that the halftones manufactured and sold conform to a recognized standard of depth, as shown in the tabular form below.

Scale of Standard Depths for Halftone Plates

Noted in 1/1000 of an inch and fraction thereof.

TONE VALUES	55 Line Zinc	65 Line Zinc	85 Line Zinc	100 Line Zinc	100 Line Copper	120 Line Copper	133 Line Copper	150 Line Copper	175 Line Copper
High Lights	8.0	6.2	4.6	3.2	2.6	2.5	2.3	2.2	1.8
Middle Tones	5.0	4.0	3.1	2.2	1.8	1.7	1.6	1.4	1.0
Shadows	3.0	2.6	2.2	1.4	1.0	0.9	0.9	0.9	0.6

There are a number of variations in halftone types and each requires a high degree of skilled craftsmanship in its production. Those generally used are as follows:

SQUARE HALFTONE . . . Just explained. In ordering plates squared by machine the usual terms are: *No line*—screen will run to edge of plate; *hairline, no white*—finishing line will touch screen; *black and white hairline*—hairline of white will separate screen from finishing line; *special line*—supply a sample of line desired.

SILHOUETTE HALFTONE . . . Only the image or figure is wanted. This is outlined by the finisher with a fine cutting tool and all the screen of the background is removed. The router has an important part in the completion of the silhouette halftone.

VIGNETTE HALFTONE . . . Some background may be wanted so it is re-etched by a finisher to fix its gradations from its natural color to pure white.

HIGHLITE HALFTONE . . . Used particularly for the repro-

duction of wash or pencil drawings. On these, the white of the paper is wanted in some areas without screen and in these areas the dot is etched until it disappears.

COMBINATION HALFTONE . . . For this, a line negative and a halftone negative are put together on one plate by hand manipulations in the negative room.

BENDAY . . . A screen or tint-laying process by which tints or patterns may be added to areas as desired. Principal application is to line-etchings. The tint or pattern is transferred from an inked gelatine stencil to the metal just before it is etched.

Color Plates

The printer requires one plate for each color to be used. Most colors can be obtained from combinations of yellow, red, blue, and black. Blue and yellow produce greens; yellow and red produce various tones of orange, and so on.

Plates for color work are of two types. First, there are those produced by combining line plates of certain areas which are to be printed in any selected color of ink without any shadings of that color. The second type is known in the trade as process plates. Benday may be applied to the first type to bring out variations or combinations of the primary colors used.

To make a set of four color process plates, *four halftone negatives* are required, one for each of the three primary colors and one for the black. The silvered collodion plate used for halftone and line negatives is not orthochromatic, that is, it is sensitive to some colors such as blue and pink, but is not sensitive to yellow, green and red. In other words, it does not photograph colors in their correct relative strength or tone value. In color separation, there are two generally used methods, the *Direct* (with halftone screen), and the *Indirect*

(without halftone screen) *continuous tone method.* In the former, the color correction is done by staging, etching, back etching, burnishing, and tooling, after the initial flat etch. In the latter, by making continuous tone negatives with color correction, then continuous tone positives, and finally the halftone screen negatives, less hand etching and hand work is required, since most of the color separation is done photographically.

Process plates are made from colored paintings, Carbro Prints, direct from merchandise, or color transparencies. They are produced as halftones and are usually two, three or four colors to the set, governed by the painting or subject to be reproduced. These are made by photographing the colored original through special filters, which eliminate successively all the primary component colors except one. The filter is a piece of gelatine placed in the lens and allows only the rays of light of a certain color to reach the negative. The three basic plates are red, blue, and yellow, and the filters used in photographing a colored subject are:

Violet or Blue	*for* Yellow plate
Green	*for* Red plate
Orange or Red	*for* Blue plate
Yellow	*for* Black plate

By using these filters, the yellow plate contains the yellow that is in the original subject photographed, the blue plate only the blue, the red plate only the red. The black is a general plate for depth of color and as an aid to the photoengraver in approaching the true values of copy reproduction.

As in the halftone, the screen is placed between the lens and the negative but the angle of the screen must be changed for each plate to prevent a "moire" or pattern. The screen

used for process plates is usually circular and the angles are: *black*, 45 degrees; *blue*, 75 degrees; *yellow*, 90 degrees, and *red*, 105 degrees. While the screen angles for the red, blue, and black negatives are 30 degrees apart, the yellow need only be 15 degrees.

These negatives are developed, printed on metal (copper), etched, and finished much the same as halftones, but with the exception that considerably more time is taken for *staging in* and re-etching by the color finisher to achieve true reproduction when the plates are color-proofed. As each color is finished, trial proofs are pulled and corrections made. A collated set of *progressives* (proofs which show the result as each successive color is added) is submitted with the final proof in order to show the progression of printing used in achieving reproduction of the original.

Sometimes these plates are mounted on metal or sent unmounted, with bearers on, to the electrotyper or printer. The names or numbers of the inks used by the photo-engraver are specified to the printer so that he will know which one to use to compare his reproduction with that of the photo-engraver. Each printer and publisher varies in types of press equipment and plate requirements, and the photo-engraver should have knowledge of this before he proceeds with his finishing.

The highly developed skill and art required in the making of the modern photo-engraving have evolved gradually. It has taken improvements in other industries and processes to make many of these refinements and skills possible.

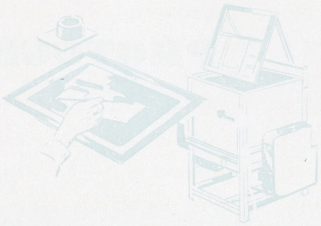
During the last 25 years there have also been vast improvements in the materials, processes, and tools of photo-engraving that have made finer work possible. Continued research with the metals—copper, zinc, and magnesium—has brought

both higher quality and greater accuracy in the gauges, thus insuring better results in reproduction.

Improvements in tools of the trade include higher speeds for routers that have improved controls to allow finer and more accurate routing procedures. Metals for router bits also have been improved. Shaving machines; electric burning-in stoves; proofing presses, which give precision to multi-color proofing; etching machines; the electronic control of camera exposures; and the scanning machine are valuable factors in better performance by the skilled craftsmen of the photo-engraving industry.

Some of the materials that give enhanced results to the process are one-coat stripping solutions for wet-plate reproduction, improved etching powders, collodions and cold-top enamels, strip films, double-coated scotch tape in blocking, and many small refinements that are hardly noticed except for their influence on the finished work.

Further research, to take advantage of inventions and improvements everywhere, is assured by the photo-engravers themselves in the organization of Photo-Engravers Research, Inc., which is supported by the various photo-engraving establishments throughout the country.



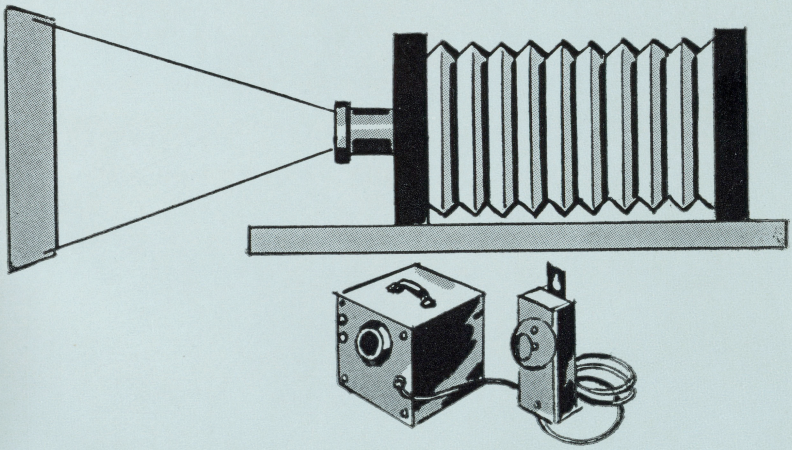
As the sun colors flowers, so does art color life.

—SIR JOHN LUBBOCK

STEP No. 1

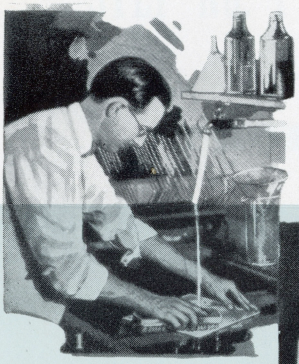
PHOTOGRAPHING

The Camera is important. These expensive precision instruments must be operated by experienced craftsmen. Care in lighting and exposure means as much to engravings as it does to motion pictures.

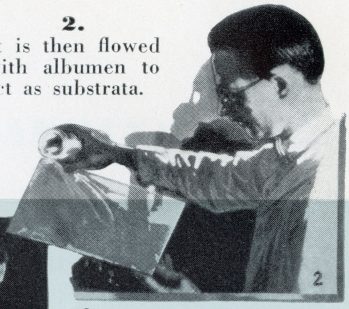


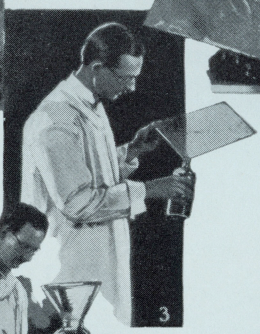
1.
Plain glass is washed chemically clean.

When strip film is used, procedures 1-4 are unnecessary.



2.
It is then flowed with albumen to act as substrata.

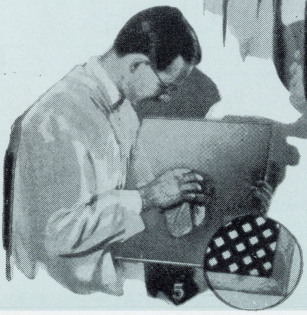




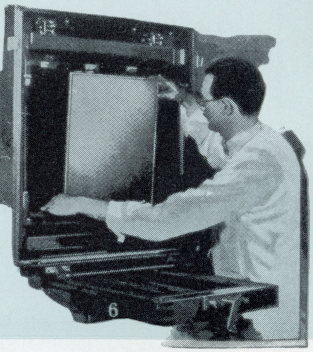
3.
The glass is now flowed with collodion.

4.
Then it is immersed in bath of silver nitrate.

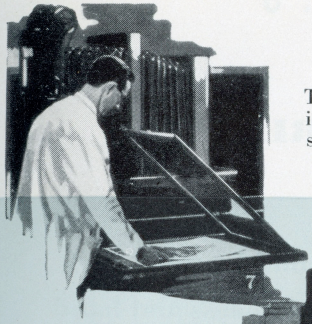
5.
The halftone screen is polished before using.



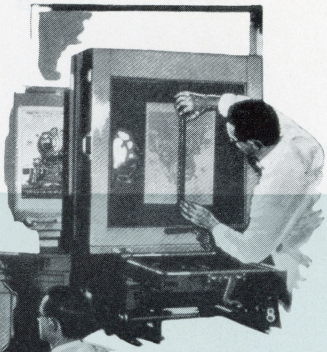
6.
Screen is inserted in camera mechanism.

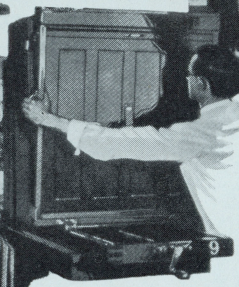


7.
The copy is placed into frame or fastened to copy board.

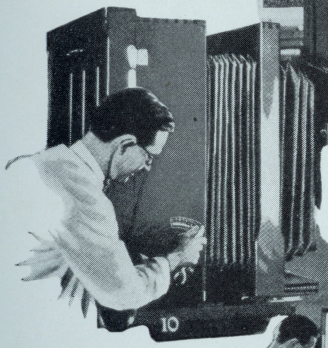


8.
Then image is focused to size.

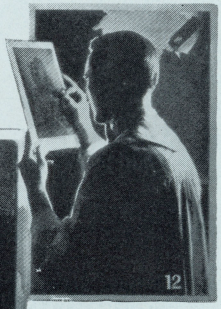




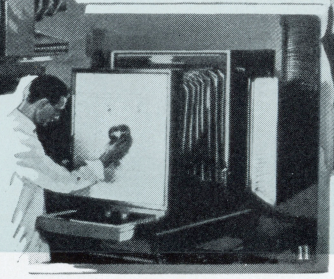
9.
Holder with photographic plate is set in camera.



10.
The screen distance is now adjusted.



12.
The negative is developed and fixed in dark room.

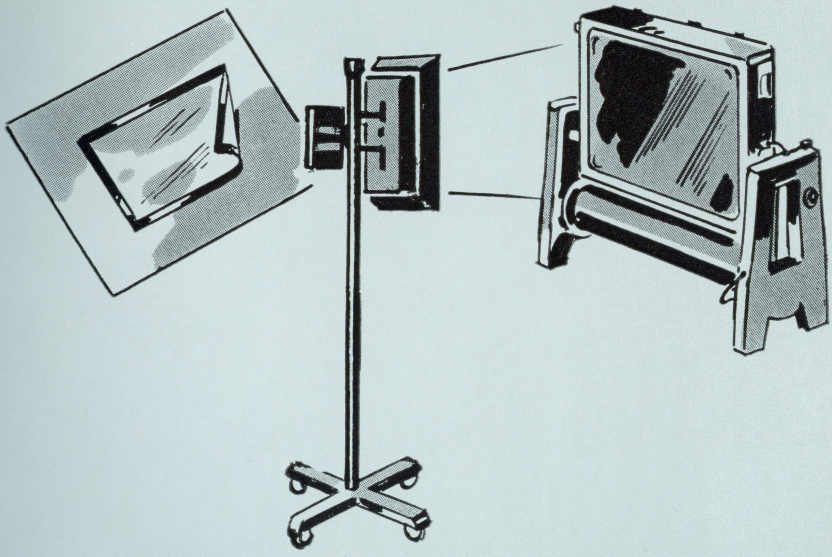


11.
The lens diaphram is set for exposure.

STEPS No. 2 and No. 3

STRIPPING and PRINTING

Here a combination chemical process and hand operation require consummate skill to achieve success in stripping or inserting of negatives and in coating and printing the image on metal.



When strip film *is used, procedures 13, 15, and 16 are unnecessary.*

13.
Negative is coated with rubber and collodion.

14.
Then it is squared and cut to size.

15.
The negative is soaked in acid bath.

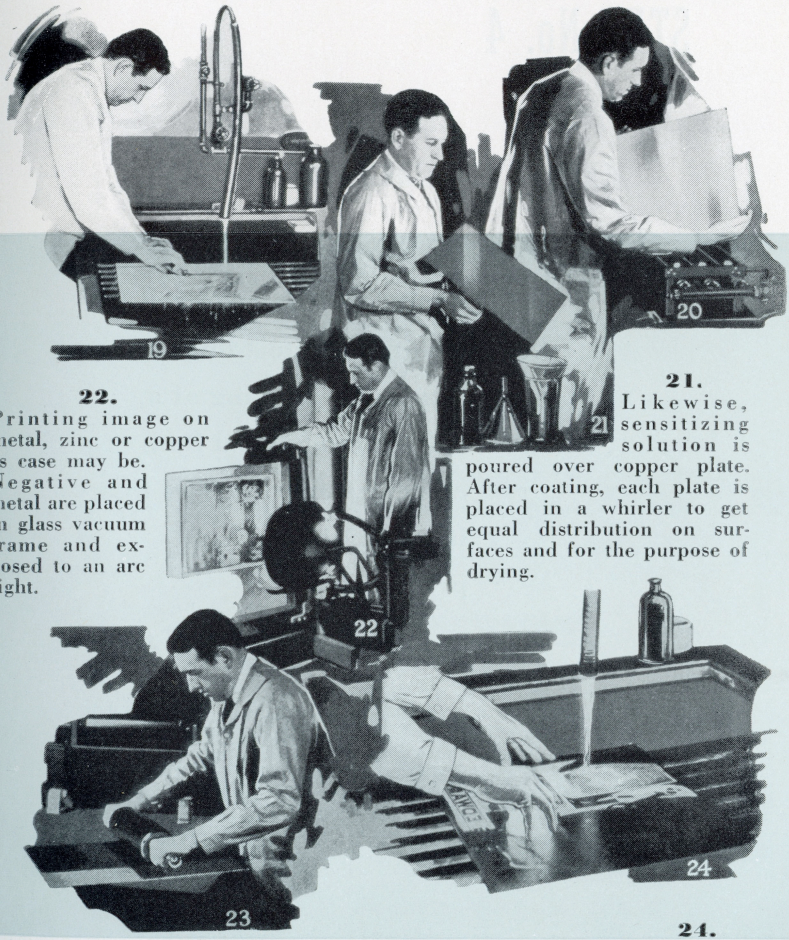
16.
Stripping the negative off glass.

17.
Film is reversed and then grouped on plate glass.

18.
The water is squeegeed out with blotter.

19.
The metal plate is polished with abrasives.

20.
Sensitizing solution is poured over zinc plate.



21.
Likewise, sensitizing solution is poured over copper plate. After coating, each plate is placed in a whirler to get equal distribution on surfaces and for the purpose of drying.

22.
Printing image on metal, zinc or copper as case may be. Negative and metal are placed in glass vacuum frame and exposed to an arc light.

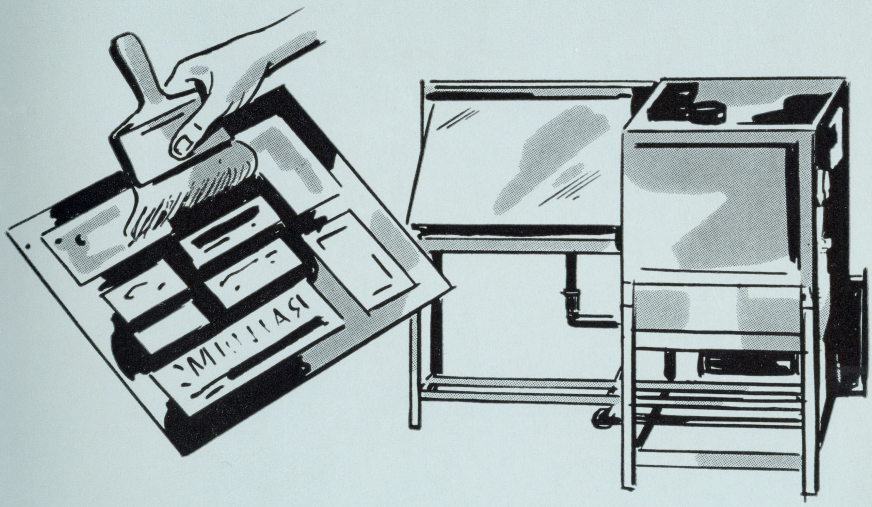
23.
Zinc prints are inked-up with a roller—or placed in developer, depending on solution used.

24.
Final developing of print under water.

STEP No. 4

ZINC ETCHING

Again, skill is required in etching. A most important step in the making of a zinc etching is that it be etched properly — so that it will mold well and print clean.



25.
The print is stained with acid to fix image.

26.
Open spaces are painted in and spots retouched.

27.
Topping powder is then applied to resist acid.

28.
The topping powder is burned in.

29.
While hot, the back of plate is painted.

30.
First bite is applied with nitric acid.

31.
After each bite, the plate is powdered four ways.

32.
Each powdering is followed with burning-in.

33.
The plate is rapidly cooled.

34.
Etching machine in operation.

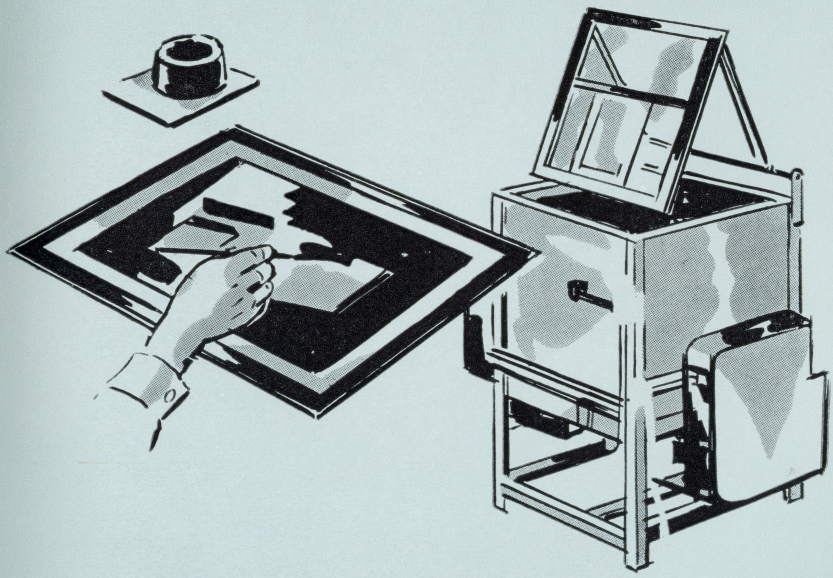
35.
The etched plate is cleaned with lye.

36.
A chamois is used to mop plate dry.

STEP No. 4a

COPPER ETCHING

To obtain good printing depth and correct tone value in the finished halftone, extreme care is necessary. Flat etching and hand brushing adds perfection to the plate.



37.
Halftone print is carbonized with heat.

38.
The print is spotted and retouched.

39.
Solution applied to remove scum.

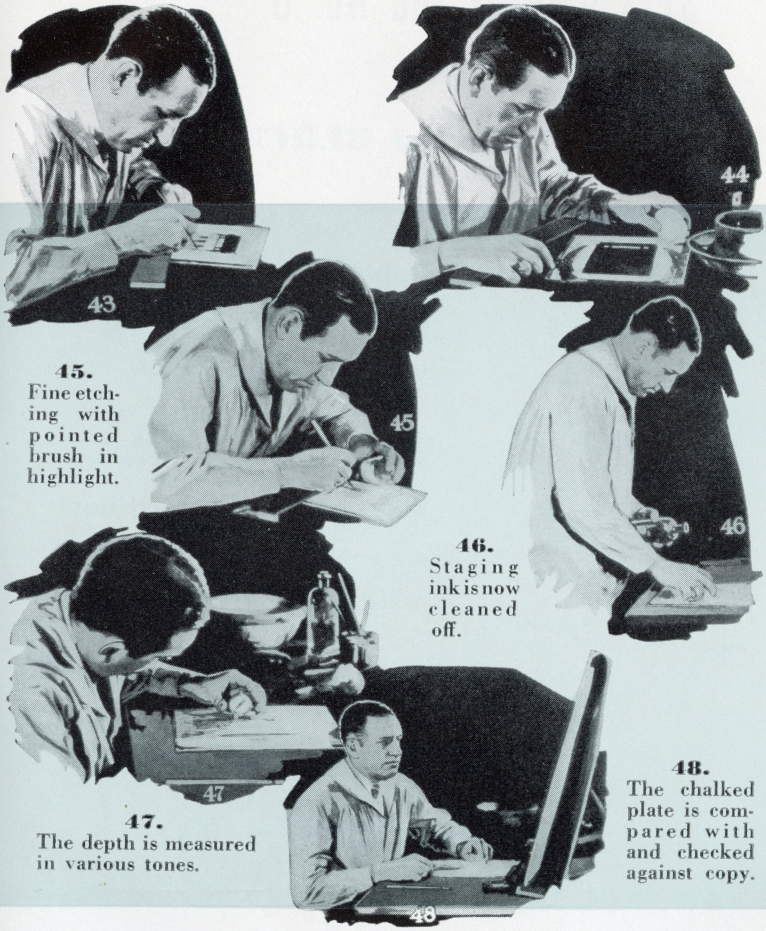
40.
Flat etch applied in still bath — or flat etch machine. Iron-perchloride is used for etching copper.

41.
The flat is mopped and dried.

42.
Magnesia is now applied to show result.

43.
Darker tones are retained by staging.

44.
Re-etching vignette by local application of acid.



45.
Fine etching with pointed brush in highlight.

46.
Staging ink is now cleaned off.

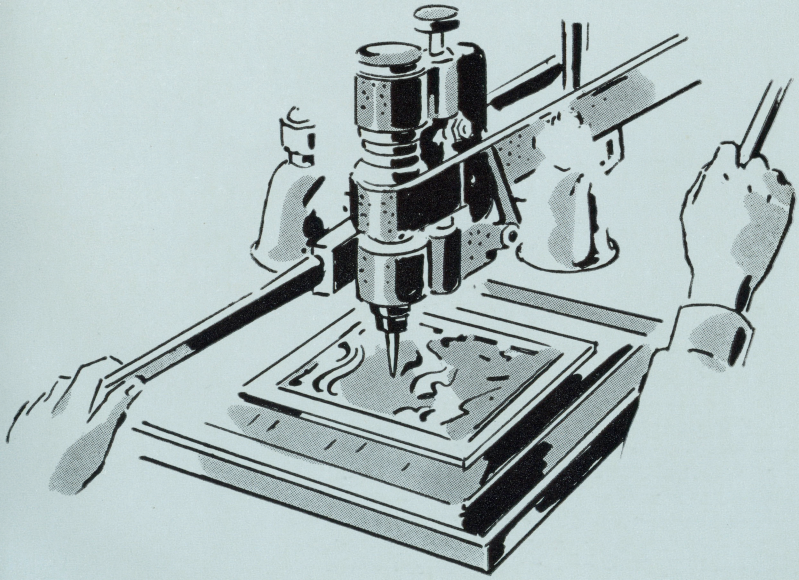
47.
The depth is measured in various tones.

48.
The chalked plate is compared with and checked against copy.

STEPS No. 5 and No. 6

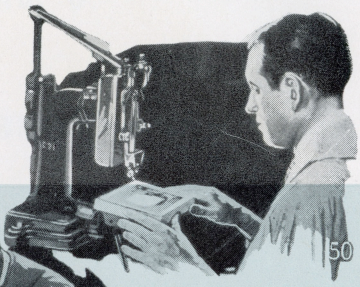
ROUTING and BLOCKING

Routing is not routine. Success here depends on the high degree of coordination of the operator's hands, eyes and feet. Careful nailing on specially treated wood assures better printing.



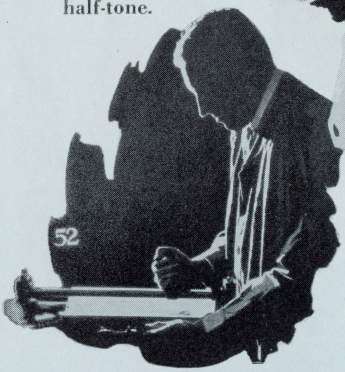
49.
Machine used for routing away unwanted metal.

50.
The engraving is nailed or anchored to block. Metal and wood together make type high—.918 of an inch.



51.
Cutting up a halftone "flat."

52.
Beveling the half-tone.



53.
Large halftones, at times, are both tacked and anchored to block. Special tape is available for flushes.

54.
Mounted engravings are cut apart.

55.
The wood block is trimmed to size.

56.
The squaring is carefully checked.

57.
The mounted engraving is planed to type height.

58.
Drilling corners of a mortise for type space.

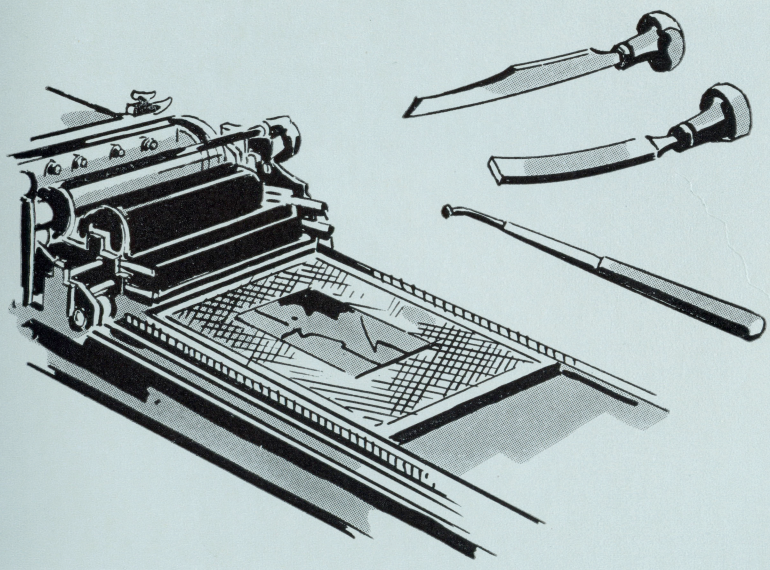
59.
Mortising with jig saw.

60.
Casting metal base for patent bed printing. This is handled in electrotyping plants.

STEPS No. 7 and No. 8

FINISHING and PROOFING

The master craftsmanship of the finisher brings excellence to photo-engraving. He tones up the halftone to bring out its highlights by hand etching, tooling and burnishing. Proofing, too, requires the hand of a technician in the mixing of inks — and the producing of a proof which shows the exact printing qualities of the plate.



61.
Fine etching is done by finisher.

62.
Plate is chalked for examination.

63.
Outlining a halftone to remove unwanted surface.

64.
Removing spots and defects from halftone.

65.
After routing, halftone is trimmed to outline.

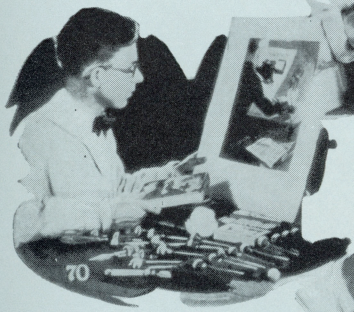
66.
Finishing corners of halftone squared with line.

67.
Zinc cuts are carefully spotted and revised.

68.
Cutting special white line with draw tool.

69.
Burnishing dark areas to increase contrast.

71.
Re - engraving highlights and tooling.



70.
Progress of work checked against copy.

72.
Scratches are repaired by lifting each dot to surface.

73.
When the engraving is finished, it is thoroughly cleaned.

74.
Vignettes and outlined engravings require a printer's overlay.

75.
Orders often call for mixing of special inks.

76.
Registering color plates on press.

77.
Press used for proofing.

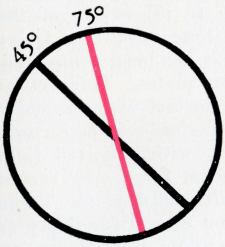
78.
Faithful reproduction is sought.

79.
The finished engraving is cleaned once more.

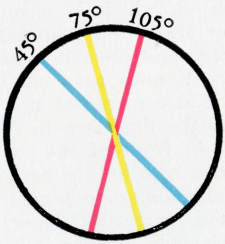
COLOR

Screen Angles and Filters

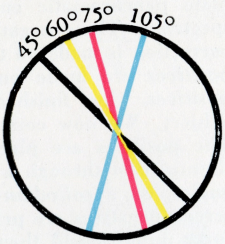
If, in color separation work all plates were made having the same screen angle, a *pattern* or *moiré* effect would take place, but by changing the screen angle of each color, no pattern forms. The strong colors—the Red, Blue and Black are placed 30° from each other and the yellow is sandwiched between at 15°. Any slight pattern that may form is not offensive, because of the fact that the yellow dot is almost invisible. However, today, in wet printing, when photographing a subject, if *120 screen* is requested, the *Red, Blue and Black* negatives are photographed through the *120 screen*, but



Angles for 2 colors



Angles for 3 colors



Angles for 4 colors

For the YELLOW		plate the VIOLET		Filter is used	
For the RED		plate the GREEN		Filter is used	
For the BLUE		plate the ORANGE		Filter is used	
For the BLACK		plate the YELLOW		Filter is used	

the *Yellow* is made with *133 screen.* This further aids in eliminating the possibility of any pattern and also helps in the trapping of the other colors.

During the exposure of a colored copy, the light reflected from the subject, before reaching the sensitive plate, passes through a color filter, which is usually placed in or behind the lens of the camera. The filter is of the complementary color to the primary color to be recorded on the negative. It allows only the rays of light of a certain color to reach the sensitized plate. The three basic plates are the *Yellow, Red, Blue.*

PROCESS PLATES are made from colored paintings, carbro prints, direct from merchandise, or color transparencies. They are produced as halftones and are either two, three or four colors to a set. Regardless of the most intelligent manipulation, the negatives of a color set are but the first step of the finished result which depends upon skill and talent. In photographing colored copy there are two methods of separation—the *DIRECT* and the *INDIRECT.*

The *Direct method* is with the use of a halftone screen. The original copy is placed before the camera and four *screened* negatives, photographed at the proper angles, are made on a photographic plate coated with emulsion, using color filter. These are printed on copper, flat etched and then given to the color finisher to do the necessary staging, re-etching, tooling, etc.

By the *Indirect Method,* a large part of the color separation is done photographically. The Color Subject is examined closely for tone values and after this study has been made, it is placed before the camera so that separation negatives can be made (*without* the screen), using dry plate panchromatic emulsion, which is sensitive to all colors of the spectrum. These negatives are called *continuous tone negatives.* Color correction is made on these negatives and, after this has been completed, *positives* are made on continuous tone emulsion plates. This set of *positives,* when finished, is also corrected and rechecked with the color subject. We now come to the final step in this method of production. The positives are placed in front of the camera, with reflected light illumination through a *screen,* to be photographed at the proper screen angles, on a *collodian emulsion, strip film* or *silver wet plate.* These screen negatives are printed on metal (copper), flat etched for thirty or forty minutes and then given to a color finisher to do the staging, re-etching and tooling necessary to produce a good reproduction. By this *Indirect* method better color balance is achieved photographically. There is less "back etching" and "shooting through", and good depths in the highlights are obtained. This method of reproduction is being used more and more.

While color separations have improved over the years, they are still far from being exact. Consequently, the task of correcting these differences falls to the color finisher, who has a thorough knowledge of color composition, in addition to his mechanical skill.

YELLOW

RED

YELLOW and RED

Color Proofs in Progression

When color plates are completed by the engraver, several proofs in full color are furnished the client plus a collated set of *progressives* as shown *here*, indicating the progression of printing to achieve the true reproduction of the original. The names and numbers of the inks used are specified so that the printer can match and compare his reproduction with that of the engraver. Printers vary rotation or progression, and the photo-engraver should have knowledge of this before proceeding with the production of color work.

BLACK

YELLOW, RED, BLACK and BLUE

BLUE

YELLOW, RED and BLACK

Enlargements Showing Screen Structure

The miniature reproduction *below*, was made with 133-line screen. The enlargement, to the *right*, was made from black proofs of each color, of the miniature, to illustrate dot formations and how color effects are obtained. If viewed at the proper distance, the dots will disappear and the continuous tones of the original will be perfectly simulated.

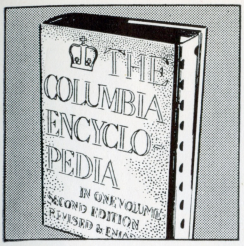
Overprinting Colors

In four (4) color *wet printing*, from high speed letterpress equipment, to make it possible for the printer to control color, the maximum intensity of ink, when totaling the color values in each of the four (4) color plates, should not exceed *220 per cent.* In two color plates, the combined screen density must not exceed *120 per cent.* If this is not observed, trapping difficulties can cause muddy or mottled printing.

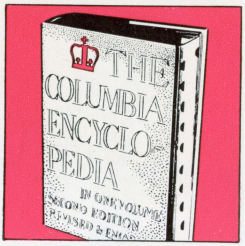
It also is recommended by most national magazines that a minimum amount of overprinting of inks be used by omitting all unnecessary under colors in the engravings. Never use four (4) colors where the desired result can be obtained in three or even two colors.

The black plates usually contain the type and text matter. A black plate should be etched so that it is light enough not to fill when running enough ink to print the headlines and text matter with good coverage.

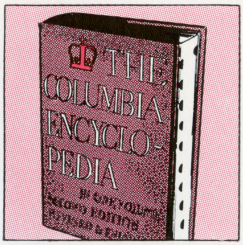
It is also important if instructions call for proofing plates, from *top to bottom*, or from *side to side*, that this be followed fully.



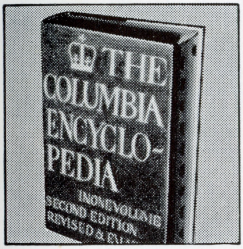
Ben Day
line etching



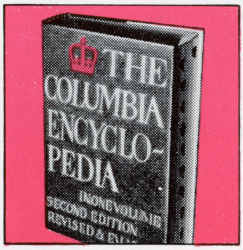
2 color line,
solid color



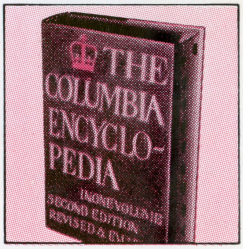
2 color line,
Ben Day color



Halftone

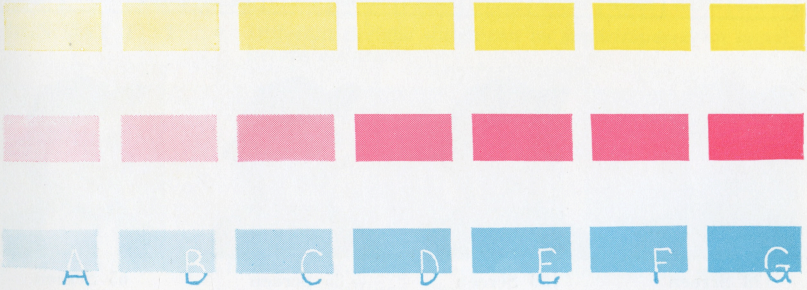


2 color (Halftone key
plate)—solid color



2 color (Halftone key
plate)—Ben Day color

The *above* illustrations, same subject, one in pen and ink (for line reproduction) and the other in wash (for halftone reproduction) illustrate the effects that can be obtained in two (2) colors. The tonal charts *below* show the primary colors—the Yellow, Red and Blue, varying from a highlight dot to a deep shadow.



VARIOUS TYPES of PHOTO-ENGRAVING

Square Halftone
No Line

Square Halftone
Line

Oval Halftone
No Line

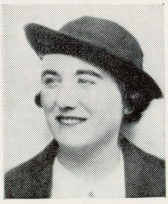
Oval Halftone
Line

Silhouette Halftone

Silhouette Vignette

Combination—Line and Halftone

133 Screen



120 Screen

85 Screen

65 Screen

Highlight
or
Dropout
Halftone
(Combination)

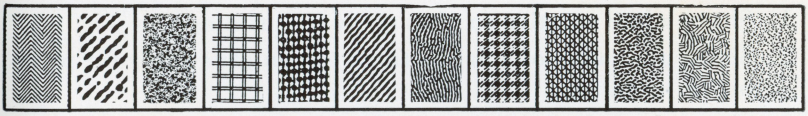
Line Etching
made from
Pen and Ink
Drawing

Gray down
of
Line Etching

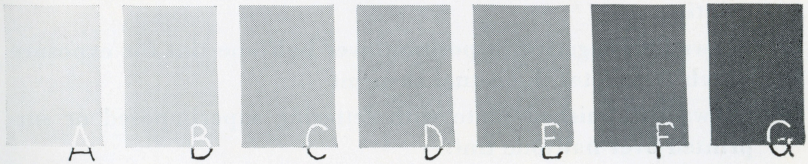
QUARTER
TONE
or
INDIRECT HALFTONE
This kind of plate is made from enlargement of smaller halftone.

HORAN
Engraving Co.
44 WEST 28TH ST. N.Y.C.

BEN DAY LINE ETCHING
The tint is superimposed by hand manipulations.

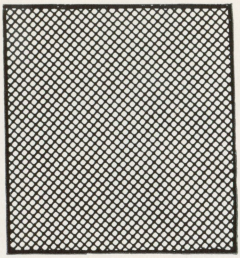


BEN DAY TINTS • Different designs which can be superimposed on metal before etching.



A TONE CHART • showing values obtainable with the use of halftone screens.

Photograph of a girl, photo-engraved without the use of a halftone screen. Just two tones—black and white obtained by this means. However, it is not practical.

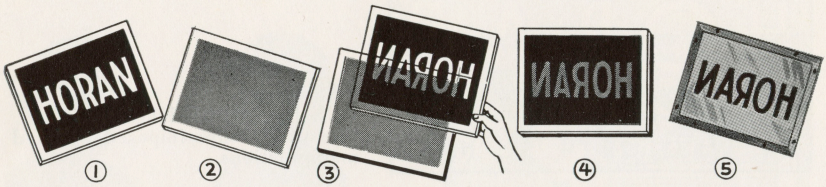


The halftone screen which enables the photo-engraver to reproduce accurately all tones of a copy from deepest black to almost white.

Photograph of same girl, photo-engraved with use of halftone screen, faithfully reproducing the original in all tones and shades.

SURPRINTING

The illustrations below show the progression of steps followed in surprinting a **line negative** upon a **Halftone subject** or flat **Benday tint.**



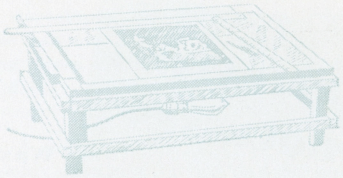
1..Shows a line negative on glass ready for printing.

2..Shows a negative of a flat halftone tint on glass ready for printing on metal.

3..Shows the halftone tint printed on metal and line negative of subject No. 1 being placed in position for surprinting or double printing.

4..Shows line negative in position over halftone tint for exposure which completes the actual surprint.

5..Shows the finished plate with lettering superimposed or surprinted over halftone tint.



The halftone, more than any other mechanical process, has helped to advance and develop illustrative art.

—ANONYMOUS

DUPLICATING PROCESSES

ELECTROTYPES

Wax Molds • Lead Molds

Tenaplate • Nickel • Plastic

Electrotyping is a duplicating process by which printing plates can be made from type forms, line-etchings, halftones or from any combination of them. A mold or duplicate impression is made of the subject. A metal shell is electrolytically deposited on the mold to a desired thickness. This shell is then removed from the mold and cast or "backed up" with molten metal. When cool, the cast is finished by straightening to a level printing surface, and beveled for patent base, blocked or curved as desired.

Names of various types of electrotypes are usually based upon either the molding material used, the kind of shell deposited, the way the plate is finished, or combinations of two or all of these factors.

The material used in the mold has an important bearing on the quality of the finished job. Generally the mold is made of *Wax*, *Lead*, *Tenaplate* or a plastic (commonly called *Vinylite*). Wax and lead are the conventional materials. A wax mold electrotype is less costly than a lead mold but it does not reproduce the fine detail of halftone plates as well as a lead mold. Tenaplate and Vinylite mold electros likewise give a better result than wax molds.

- **Wax Mold.** This consists of a thin plate of lead or copper base supporting a wax compound about $\frac{1}{8}$ of an inch thick.

- **Tenaplate.** This consists of a sheet of aluminum foil supporting a special molding composition, and may be purchased by electrotypers ready for molding in rolls of various widths.

Lead Mold. This consists of a thin sheet of soft pure lead. Only unblocked original or copper plate patterns of type matter can be molded in lead.

Plastic Mold. A plastic mold is made from original engravings, pattern plates, or type forms to be duplicated. This mold can be retained indefinitely. *Plastic Plates* made from this mold are duplicate plates that serve the function of electrotypes and stereotypes. They are much lighter in weight than the metal electrotype and are capable of withstanding the strain and impact of the printing press. Plastic plates can be sawed, nailed, routed, mortised and tooled.

Copper or Nickel (Steel) **Shells.** A copper shell consists of copper electrolytically deposited on any of molds mentioned above to a thickness of eight to ten one-thousandths of an inch.

A nickel or "steel face" shell consists of nickel electrolytically deposited on the mold to a thickness of one or two one-thousandths of an inch and reinforced with a deposit of copper to desired thickness.

Finishing. After the shell is cast or "backed up" with metal, the plate is finished, shaved to any desired thickness and either beveled, blocked or curved.

Beveled Plate is trimmed close to edge of subject matter for patent base.

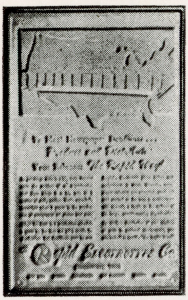
Blocked Plate is mounted on wood to type high thickness.

Curved Plate is curved to fit any specified cylinder size.

Chromium cannot be deposited directly on the mold. An electrotype may be plated with chromium after it is completely finished where extremely long press runs are required.

Wax Engravings. This consists of a plate of lead or copper base supporting a thin film of wax. Rules and designs of intricate nature are drawn in the wax film by ruling machines or by hand from original copy. Impression of type can also be made. Used principally for rule and map jobs. The wax engraving serves as a wax mold on which the shell is deposited and an electrotype made.

MATS and STEREOTYPES



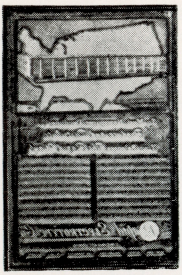
A Mat

Unmounted originals, of zinc or copper, in *line, coarse screen halftone, type matter* or *electros* are used as *patterns* for rolled or direct pressure *Mats. Wood Engravings, Rubber* or *Linoleum* plates cannot be used as pattern plates due to the extreme pressure used in molding. A *mat* is a mold only, so therefore it cannot be printed from. It is only after a casting is made from a *Mat* that you have a printing plate.

There are many different materials used for making *stereotype mats*, but they are all similar in one respect, they do not melt or burn up when the molten casting metal is forced into them. One of the reasons for this is that the molten metal is forced into complete contact with the mat so quickly that most of the air is driven from the space between the metal and mold.

A Curved Electro

The material used for *stereotype molding* comes in large, flat flexible sheets, somewhat like smooth blotting paper. Full size newspaper pages can be molded from these sheets. The casting made from a mat is termed a "*Stereotype*" or "*Stereo.*"



An Electrotype

If a stereo is to be curved it is necessary that the *mat* be curved first in a casting box of the right size and curvature, so that the *stereo* will then have the proper curvature for the press on which it will be used. It is a very inexpensive process, and used more for *newspapers* and *book printing.* Stereotypes can be nickel faced or chromium plated to add life, when used for long press runs.

Mats are shipped to newspapers and publications which have facilities for making their own stereotypes.

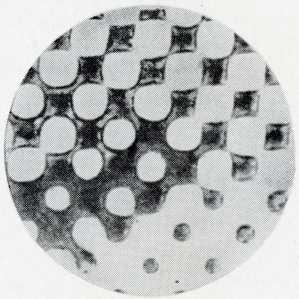
Practice and experience are of the greatest importance in all works of art.

—COLUMELLA

THE THREE PROCESSES

Letterpress

In Relief or *Raised Surface* printing the design on the metal, zinc or copper, is in a higher plane than the surrounding surface. This is accomplished by etching with acid. The design area being protected by acid resist is unaffected. In printing, the inking roller touches only the parts which are in relief and the printed impression is made when the paper passes between the raised surface and the impression cylinder. A photo-engraved plate is a photo mechanical process of making printing plates, the surface of which is in relief for letter press printing.

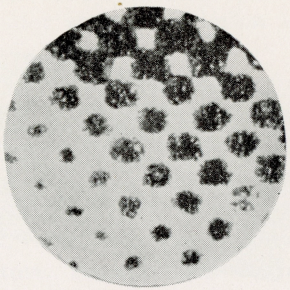


Letterpress Printing
Enlargement of
Halftone Plate

Offset

In Planographic or *Surface* printing the design is in the same plane as the surrounding zinc or aluminum surface. By the use of acids, the blank parts of the plate are made ink repellent when water is present and the design, ink attracting. In printing, the plate is attached to a cylinder and as it revolves, comes into contact with a dampening roller which dampens the blank areas of the plate. The design, which is covered with a greasy substance, repels the water. As the plate revolves, the inking roller inks

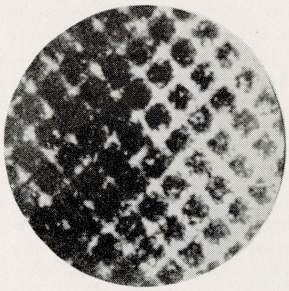
the design and the blank parts, which have been dampened, repel the ink. The plate either prints directly upon the paper as in "*Lithography*" or deposits its design upon a rubber blanket which acts as a printing surface as in the "*Offset*" process.



Offset Printing
Enlargement of
Planographic Plate

Rotogravure

In Intaglio or *Sub Surface* printing the design is either carved or etched below the surface of the copper plate or cylinder, thus producing grooves or cells below the surface. When the design is carved in a plate, it is generally referred to as "*Engraved*" as in the case of the plate from which a calling card or wedding invitation is printed. When a design is scratched by an Artist in a special wax coating on a copper plate, thus exposing the copper, and the plate is then etched with acid, the process is called "*Etching.*" The "Etchings" sold in art shops are the product of this method. The etching of a design in a flat plate with acid, through the medium of a sheet of sensitized gelatine, technically known as carbon tissue, on which it has been produced by photography, results in a process known as "*Photogravure*" meaning "*Hand Gravure.*" When this method is applied to a copper cylinder, the process is called "*Rotogravure.*" In Rotogravure the cylinder revolves in an ink fountain coming out covered with ink. A thin steel blade, the length of the cylinder, known as the "Doctor Blade," moves across the surface scraping all of the superfluous ink from the cylinder, leaving the surface clean, the ink remaining only in the sunken areas of the plate. The paper passes between this copper cylinder (curved plate) and a rubber impression roller which forces the paper into the etched parts and the ink is thus deposited upon the paper to give you the final printed impression.



Enlargement of
Intaglio Plate
Rotogravure Printing

PREPARATION of COPY

Illustrations are a potent force in explaining or selling a product or an idea. Therefore, when a line drawing or a photograph is presented to a photo-engraver for reproduction as a line etching or halftone, it is essential that it be *prepared properly* to retain its *full value.* The subject, for good reproduction, should be sharp and clean and have contrast.

Most photographs need some retouching because of the many obstacles to perfect shots, such as poor lighting, bad positioning, cramped quarters and other factors. Even the planned advertising illustration, originating in a studio, may require spotting, lining or separation. Arc lights cast double shadows—highly polished metal surfaces pick up hard black

This photograph of a lens *(1)* was given to the engraver with instructions to silhouette the lens, i.e. lose the background, when the halftone was made. The photograph should have been given to a retoucher first in order to make the reproduction clean and sharp (*see (2)*) and if silhouetting was desired, the lens should have been set off from the background by the artist (*see (3)*) for the best results. The better copy is prepared, the better the reproduction.

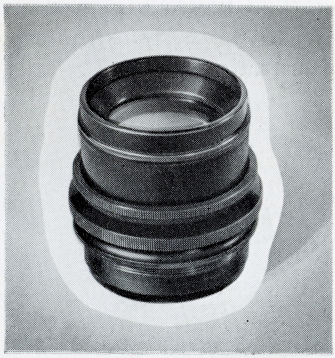
(1) Unretouched photograph

reflections — colored surfaces do not always photograph in black and white in their proper color strength relation to other surfaces.

Only the *airbrush*, a miniature spray gun, is suitable for retouching photographs. The retoucher, an expert, seems to wield it as a magic wand to improve, enlarge and finish a subject so that it will be ideal for reproduction by the photo-engraver. So delicate is the airbrush control that the operator, at will, can produce a tiny dot, faint line, deep shadow, smooth tone or a coarse spatter texture. Backgrounds can be changed in tonal values, and the subject matter can be strengthened, sharpened and highlighted. In fact, almost anything can be done to a photograph by the retoucher, with the use of his chief tool, the airbrush, which is about the size of an ordinary fountain pen and operates by compressed air.

In preparing pen and ink drawings, all lines should be sharp and clear for good results. When made for newspaper reproduction or for printing on rough stocks, they should be drawn open—not too many heavy areas of black. Often it is necessary that the engraver make Ben Day plates of such illustrations—that is, a "*gray down*" plate—in order that they print properly. Grease pencils may be used on sharply tex-

(2) Retouched photograph



(3) Retouched and silhouetted photograph

tured surfaces to produce copy suitable for line etching reproduction.

The effect of the differences between the photographic and reproductive processes evidences itself principally in black tones, dark middletones, and highlights; and so the volume and distribution of these three tones in a picture are the factors that determine its value as reproductive copy.

KEMART

A highlight process utilizing ultra violet light in conjunction with a specially prepared drawing board to produce a facsimile reproduction. Kemart illustration board and drawing paper are treated to fluoresce under Kemart purple light. A drawing is made on the board that will highlight wherever no wash is applied to the board. Also available is a special white wash which can be applied to any photographic print as you would apply chinese white.

In photographing through a yellow filter and the Kemart purple light, a line negative is obtained wherever the solution is applied after an exposure of fifteen (15) minutes. The screen negative is then shot on the same negative using normal halftone exposure. The result is a finished dropout negative exactly as the artist planned the dropping out. See illustrations below.

◀ A Kemart halftone

A regular ▶ halftone

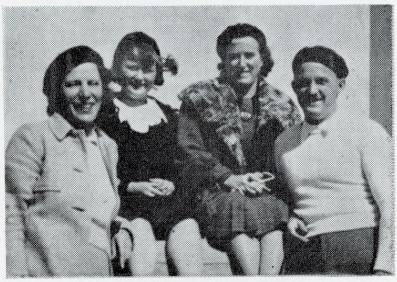
RESULTS TO BE EXPECTED from VARIOUS KINDS OF COPY

From:	*Halftones*	*Line Etchings*
Wash drawing, watercolor, etc.....	good	no
Line drawing (pen and ink).....	good	best
Crayon, charcoal or pencil drawing.....	good	good, but for pencil drawing, poor
Photograph	good	no
Scraper board (lines), stipple, etc.....	poor	best
Reprint from wood engraving.....	fair	good
Reprint from halftone.....	not recommended	fair, if coarse screen
Reprint from line etching.....	no	best
Photostat	no	yes
Lithograph	fair	poor
Steel and copperplate engraving.....	good	fair
Maps and intricate rule work.....	no	good, if sharp and clean copy; reproduce better on Copper
Combination wash and pen and ink.....	good	no
Oil paintings	good	no
Type matter, printing, etc.....	no	best

POINTERS

The better the original copy, the better the resulting halftone or linecut. Clear, clean-cut copy should be used if you wish sharp, clean-cut halftones.

EXAMPLES

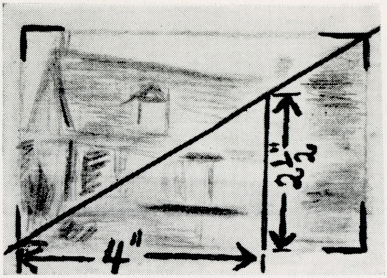


A mask insures the marking of a photograph or drawing carefully and accurately.

Lines drawn on the face of a photograph destroy it for future use. Keep the face clean. Place size markings in the white margins of a photograph. This is an aid in making accurate sized photo-engravings.

EXAMPLES

Measure prints for size with extreme care. A simple slide rule provides a quick and direct answer to halftone size or by drawing a diagonal line on tissue — or on back of copy (lightly), across the area to be reproduced.



EXAMPLE →

Measure, say four inches from the start of the diagonal line—and where the vertical line from this point intersects the diagonal, you will find the height of plate.

Call for blueprints on intricate set-ups whenever there is a doubt. Saving of time and money will be the net result.

Whenever possible—always have printer supply stock for proofing. This will enable you to see more clearly the finished result—and at the same time act as a true guide for your printer.

Consult both printer and photo-engraver about stock and halftone screens to be used. The result will be a better printed job.

It is smart to order color proofs—whenever you have a problem of registration. The engraver cannot guarantee register of plates proved with folios.

Sixty-five-line screen—should be the finest used for newspaper printing. But better results are obtained in newspapers outside metropolitan areas with 55-line screen.

Wet plate negatives cannot be held indefinitely and duplicate plates should be ordered at the same time or shortly thereafter. Consult your engraver on this.

Repairs upon damaged plates are made at the owner's risk.

Rush work can be turned out, but more satisfactory results are obtained if the photo-engraver is given sufficient time to properly do each operation.

Make your engraver responsible to you—respect him for the knowledge he has of his craft.

Visit the plants with which you are doing business and learn of their various problems. Observe how the human element enters into the many steps of Photo-Engraving—and note the possibility of errors when insufficient time is given to an engraver.

For ECONOMY In REPRODUCTION

A. Prepare copy *complete.* Furnish engraver with art in one piece. This avoids extra negatives and setting up.

B. Avoid *surprints* whenever possible.

C. Avoid *combination* plates.

D. Avoid *dropout* halftones.

E. Coarse screen *velox jobs* are economical.

F. Use *Zinc* for reproductions whenever possible.

G. Furnish *clean* copy. This avoids extra finishing, etc.

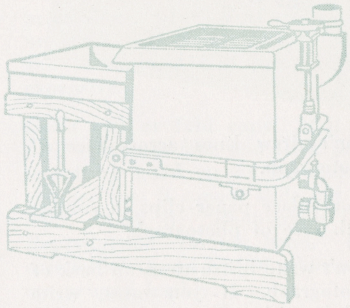
H. Avoid calling for *additional* or *extra* proofs.

I. On color work which does not have close register, avoid color proofing. Request *folio proofs.*

J. Where folder or booklet does not warrant two (2), three (3), or four (4) color process reproductions, prepare art in *black and white* for simple two (2) or three (3) color line reproductions, (for solid or Benday manipulation.) By consulting your *artist* and *engraver* in advance, many inexpensive effects can be obtained with good results.

K. Avoid *makeovers.* They are costly.
Check all copy for sizes and other details.

L. Haste, too, often makes waste. Avoid *overtime* charges.



Everything splendid is rare, and nothing is harder to find than perfection.

—CICERO

DON'TS

Don't draw lines across face of photograph.

Don't place paper clips in contact with face of photograph.

Don't write instructions on back of photograph. If you must, write lightly with soft or grease pencil.

Don't paste paper on back of photographs. Tip it on, if necessary.

Don't typewrite on photograph, ever, unless you wish it to appear in halftone.

Don't fold a photograph. Cracks will appear in the finished plate.

Don't roll a photograph face in.

Don't expect clear, sharp halftones from inferior prints.

Don't blame your photo-engraver if your sizes are not plainly marked, —"between the marks," "on the work"—etc.

Don't expect 150 or 133-screen halftones to print well on anything but a first grade coated paper—without problems arising. 150 screen contains 22,500 dots per square inch and 133-screen 17,689 dots per square inch.

Don't expect good printing results from 85-screen halftones on news print.

Don't fail to consult engravers about proper screen to print well on paper to be used.

Don't have your engraver enlarge from copies for reproduction. Reductions are always more satisfactory.

Don't use retouch pigment with blue cast. Light blue does not photograph, hence cut will look washed out and flat. Use pigment with gray cast.

Don't confuse "Reverse" and "Positive."
REVERSE means that everything in copy will face opposite.
POSITIVE means you want white lettering, etc., on black background.

Don't forget blocking instructions to engraver. There are numerous ways of blocking and many requirements, depending on type of press to be used.

Don't expect a clean and sharp halftone reproduction from a subject made up of various pictures pasted over parts of each other. It is almost impossible to avert the

casting of a shadow on the superimposed portion.

Don't forget to indicate on drawing whether guide lines for Benday or color separation are to remain or to be removed. A good plan is to have artist draw the guide lines to be removed, in red ink; those to remain, in black ink.

Don't fail to specify your requirements on plates that "bleed" on page. As a rule a minimum of $\frac{1}{8}$" is required, but consultation with your printer or publication is most important.

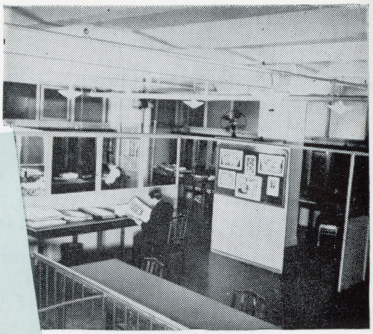
Don't overlook, when in doubt, on plates for magazines, the importance of checking the STANDARD RATE and DATA publication for information as to sizes, screens and other requirements.

Don't buy photo-engravings on price alone. Cheap cuts are worth no more than you pay for them and in the end will prove more expensive.

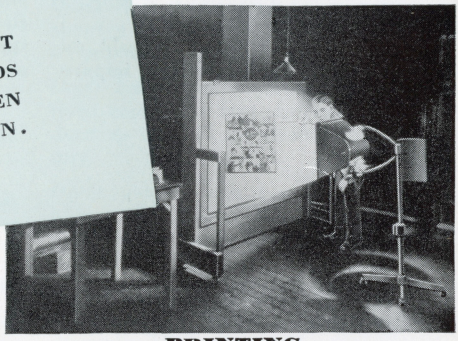
Don't roll or fold copy. Mail it flat, with both face and back protected by good strong cardboard and see that it cannot slide out at ends. Mark it: "Photograph for Reproduction—Do not bend." Be sure both TO and FROM addresses are printed legibly.

DEPARTMENTS of an ENGRAVING PLANT

EACH ENGRAVING MUST PASS THROUGH THE HANDS OF AT LEAST EIGHT MEN BEFORE COMPLETION.



OFFICE



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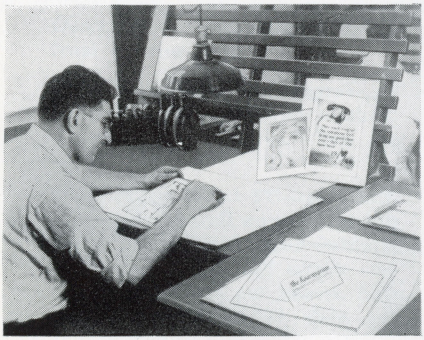

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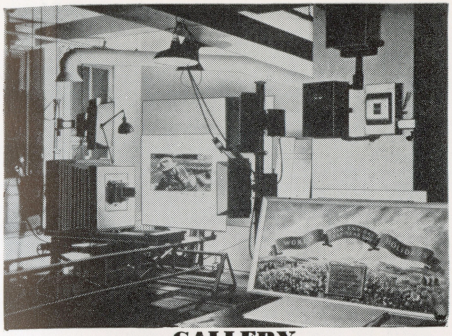
BENDAY AND COLOR



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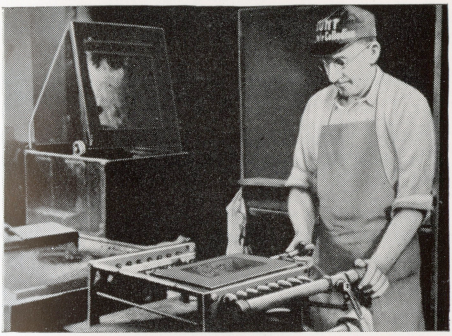

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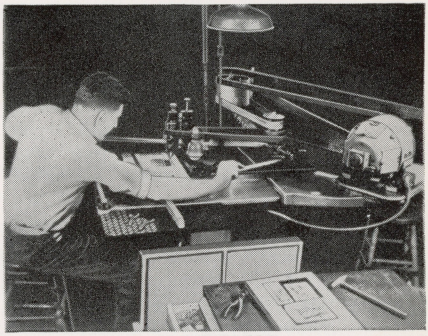
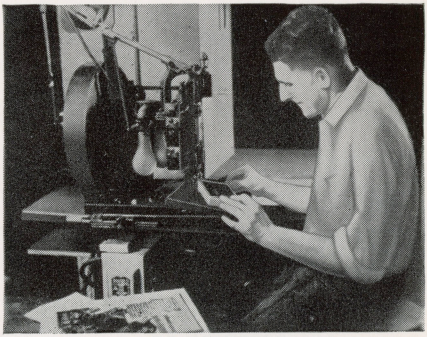


ROUTING

PROOFING



BLOCKING

GLOSSARY

Aberration...Convergence to different foci. Term used to denote faulty or incorrect focus of lines and colors.

Achromatic...Without color. A lens which refracts light of all colors equally is said to be achromatic.

Acid Blast Etching...A process for the mechanical etching of photo-engraved plates.

Acid Blast Machine...A mechanical contrivance in which an etching solution is driven by powerful blowers through a system of sprayers arranged in the base of an acid chamber and directed into the surface of the plates held in an inverted position against the spray in the upper part of the compartment.

Actinic...Chemically active but mostly invisible light rays as distinguished from visual rays. The rays which act upon photographic emulsions.

Air Brushing...A method of placing smooth, tint surfaces on a photograph or wash drawing. A liquid pigment is blown in a spray through a tool by aid of compressed air.

Anchoring...Fastening plates on to wood blocks by metal columns through the back of block.

Aquatint...A method in which the surface of a plate, after the design has been outlined upon it, is coated with a powdered rosin preparation and etched. This produces a graining in the finished print which gives the effect of an India Ink drawing. This process has been largely superseded by lithography.

Aquatone (now termed OPTAK) ...Aquatone printing, like OFFSET, is possible because water and greasy ink repel each other. The chief difference between the two processes lies in the fact that the aquatone is a sheet of monel metal with a very thin coating of gelatine. Up to 400 line screen is used in the process. Excellent results obtained from art subjects, either in monotone or in color. Satisfactory where runs are not as long as in commercial work.

Aquarelle...French word for a water color painting made in tints of pure color, without the use of white or other body color.

Artotype...A photo-engraving

made by a variety of the gelatin process.

Autochrome...Lumière plate used for making photographs in natural colors.

Bac-Etch...Patented method of correctly registering the image and etching the back of an engraving to produce a premade-ready plate.

Backing Up...Covering the back of a photographic plate with an opaque, light-absorbing medium, to reduce halation. Also, a metal backing soldered to printing plates to make them 11 points (0.152″) thick for use on patent blocks or printing bed bases.

Base...Synonymous with block.

Bassani...The name of the inventor of apparatus applicable to a process camera by which the halftone screen may be decentralized and rotated during exposure.

Bearers...Excess metal around or within the printing area of a plate. Also called dead metal. Also strips of metal sometimes placed at sides of plate when hand inking and proofing.

Benday...A method of laying tints (composed of dots, lines or other textures) on negatives, metal prints or copies. Ben Day was name of inventor of the process.

Benday Plates...Plates made by laying tints on copper or zinc and etching them to produce textures, colors or combinations of colors when printed.

Bevel...Machined straight edge margin of plate used as flange for mounting plate on block.

Beveling...Plates that are rectangular are put on beveling machine making an eighth of an inch channel, this being used to nail plates on wood. Black and white lines are also put on plates with this machine.

Bite...Trade term for etching on metal plate.

Black and White...Term used to distinguish between monochromatic and polychromatic subjects.

Black and White Line Finish...A fine black finish line separated from the edge of the halftone by a white line of equivalent thickness.

Bleach Print...A silver print used as a basis for an pen drawing, the photographic tones being readily bleached out by the application of bichloride of mercury or other bleach.

Bleed...Area of plate or print extending beyond edge to be trimmed.

Block...Wood or metal base on which plate is mounted.

Blocking...Fastening the plate upon a wood base.

Blocking Flush...Trimming block flush on top, bottom, sides or all around, so that printing surface is flush with the block.

Blow-up (half-tone)...This is done by making either a halftone negative or an etched halftone plate with a finer screen and then enlarging either, photographically.

Blue Print...A sensitized photographic paper yielding a blue and

white print upon development; also trade name for a stained blue unburned print on metal.

Border...Finishing line or design on plate.

Bourges Shading Sheets... They come Opaque with halftone benday and character effects on *transparent* plastic sheets in black and white. There are also *Trans-opaque* red sheets in same detail as above, that are transparent to the eye and opaque for photography and contact printing. These sheets are placed over original copy to add shading, character or detail.

Brass...An alloy of copper, about two parts copper to one part of zinc. It is a harder metal and less expensive than copper, but requires more time in etching. It is occasionally used for line and halftone plates for long press runs, but its main field is for *stamping plates* and *embossing dies.*

Burnishing...To rub plate with a polished steel burnishing tool to darken printing area of plate, by spreading dots.

Burr...Metal turned up above print ing surface by routing cutter o. other tool.

C.P....Abbreviation for "Chemically Pure."

Camera...Light-tight box, consisting usually of front and rear element joined with bellows, and provided with means for attaching lens at front end and plate-holder at rear end.

Carbon process...Method of producing positives on gelatine impregnated with a pigment. Used in rotogravure.

Cast...Anything formed by pouring, while liquid, into a mold as stereotype metal into a matrix.

Cellograph...Halftone plate made of celluloid instead of metal.

Cerography...Engraving in wax—used largely by wax engravers.

Chalcographer...An engraver on copper or brass.

Chalcography...The art of engraving on copper or brass.

Chalk...Magnesium carbonate in block or powder used to fill in etched areas of plate to show tone values.

Chewed...Shop term for the ragged effect of the lines of a plate caused by acid working through an imperfect protection.

Chromatic...Relating to color—abounding in color.

Chromatone Process...A simple process for making color prints from three color separation negatives. Black and white silver prints are made from the three negatives taken through blue, green and red filters on a special stripping paper which is of sufficient speed to make prints by contact or projection. Within a short time after development, the paper base can be removed, leaving the images on a thin but tough collodion film of about one-thousandth-inch thickness. These silver images are then toned to yellow, magenta and blue-green respectively in special toners and are easily superimposed upon a white backing paper. When dry, the prints have great color brilliancy.

Chromium Plated...Printing plates

upon which an electrolytic deposit of chromium has been made to provide greater wearing qualities.

Cliché...A French word for a stereotype or electrotype. A printing block made by the halftone or similar process.

Circle...Term denoting shape to which plate is to be cut. (Plates so ordered should carry clear instructions as to finish — such as: no line; hairline, no white; hairline, fine white inside. "Special line" should be accompanied by sample.)

Coated Paper...Paper having a woodpulp or rag base, coated with clay composition on one or both sides.

Cold Enamel...Bichromated Shellac or other colloid. An acid resist photographically applied to metal. Does not require heating or burning in.

Collodion...Pyroxylin (nitrated cotton) dissolved in alcohol and ether.

Collodion, Negative...Collodion containing haloid salts used for wet plate photography. Requires sensitizing in silver bath.

Collodion, Stripping...Plain collodion containing castor oil used for coating wet plate negatives to strengthen film before stripping.

Collodion Emulsion...Collodion containing silver haloid in suspension.

Color Artists...The term applied in some localities of the photo-engraving industry to designate film-layers or those skilled in the laying of tints from the Benday or similar patterns. The more fitting designation is Benday artists and the work of their department is generally known as Benday work. In many cases it may not involve the actual laying of tints, some classes of work being largely of a solid color nature involving the "painting in," incident to the separation and diversion of a color scheme into a number of color plates.

Color Filter...A colored substance such as glass, dyed gelatine, or colored solution, used to absorb certain colors and transmit others.

Colorgravure...A term designating the rotogravure process, but specifying the use of color.

Color Guide...Graphic instructions for color rendering or placement.

Color Proofs...Proofs of color plates combined and registered.

Color Proofs...Progressive... Single proofs of each plate of a color set and combined proofs showing result of each successive color printed and assembled in printing sequence.

Color Separation...Separation of colors in negative making by means of color filters, and in plate making by means of drawing upon the plate with acid-resisting paint.

Color Work...General term for color plates to print in two or more colors.

Color Work...Benday...Any Benday plate used in conjunction with a color set.

Color Work...Process...A set of two or more halftones made by photographic color separations.

Combination Plate...Halftone and line work combined on one plate and etched for both halftone and line depth.

Combination Plates ... Color ... Plates made by the use of a key plate and color plates, either halftone or line, to be printed in two or more colors.

Complementary Colors...The complement of any color is the combination of the other colors completing the spectrum.

Compensators... Movable steel rollers over which the web of paper is carried. Through adjustment of these rollers it is possible to regulate the position of the cut-off of the sheet and to keep the printing area of each page properly positioned.

Connected Dot...Halftone dots in negative or plate which are joined together.

Continuous Tone Negative...One made without the use of a halftone screen.

Contrast...The quality of an illustration possessing a wide difference in tone values. One in which the highlight and shadow tones are strongly in evidence.

Copper Etching...The act of etching a copper plate. Also an etched copper plate.

Copper Printing ... Copper plate printing is mostly confined to small runs, such as *wedding invitations, announcements* and *visiting cards.* This is intaglio printing and plates are either hand engraved or machine cut.

Copy...The original, be it photograph, drawing, painting, design, object or anything that is in process of reproduction for printing purposes.

Cromolite (see Kromo-Lite).

Crop...To cut off an edge or trim.

Cross-Hatch...A series of parallel lines crossed with others at any angle.

Cross Line Screen ... Halftone screen having lines crossing at right angles as distinguished from straight line screen having no cross-line.

Curved Plate...One that is backed up and curved to suit the cylinder of a rotary press.

Cut...An obsolete synonym for a photo-engraving or plate. Originally referred to as wood cuts.

Cylinder Press...A cylinder press has a flat bed for the form but an impression cylinder that takes the place of the platen. The paper is carried around the cylinder and the printing process is a continuous rolling impression.

Dead Metal...Excess metal around or within the printing areas of a plate. Also called bearers.

Deep Etch...Sinking or "running down" the open parts of a photo-engraved plate to acquire the necessary printing depth.

Deep Etching...Bites additional to the first bite given line plates or coarse screen halftones.

Detail...Minute or specific subdivisions of an image.

Digging Out...Removing small pieces of dead metal in plate with hand tools.

Dimension...Width of an image measured horizontally or depth measured vertically.

Dimension Marks...Points indicated on a copy outside the area of the image to be reproduced, between which size of reduction or enlargement is marked.

Direct Halftone...A halftone for which the screen negative is made by direct exposure of the article itself, and not from a photograph or drawing.

Distemper...A form of painting done with body colors mixed with white and a sizing medium, usually a glue size. Commonly used by scenic artists for theatrical work.

Dots...**Halftone**...Minute, symmetrical, individual subdivisions of printing surface formed by halftone screen.

Double Print...Prints from two different negatives occupying fixed positions on the same piece of metal but not necessarily superimposed.

Dragon's Blood...A rosinous acid-resist powder to prevent under cutting while etching.

Drawing...Finished work of the artist (either by brush, pen or other medium). It is the copy from which reproduction is made direct. It contains every detail desired to show in the finished photo-engraving.

Drop Out...When the highlight dots of a halftone are etched away they are said to be "dropped out."

Drop Out Negatives...Halftone negatives in which highlight dots are so exposed as to prevent their printing on the metal. When the plate is etched the highlights "drop out" and can be deep etched.

Correct name is "highlight" negative.

Dry Brush Drawing...Drybrush is a medium which, if properly applied, can be very beautiful. It has the added advantage of being suitable for inexpensive line cut reproduction for newspaper. It is achieved by the use of black india ink that has partially dried on the brush and gives a grey character to the brush strokes. A difficult and highly distinctive technique.

Dry Plate...Photographic plate on which light-sensitive film is dry.

Dry Plate Negative...Term customarily used to denote continuous tone negative as distinguished from halftone negative.

Dry-Point...The production of incised lines on a copper or steel plate, mechanically, with a sharp steel point as distinguished from *Etching*, in which the lines are bitten in by acid.

Duograph...Two halftone plates at different screen angles made from one monochromatic copy and printed to produce two-tone effect. Key plate printed in dark color, second plate, etched flat, printed in light tint.

Duogravure...A process in which two plates are used to produce a print in one color.

Duotone...Set of 2 color process plates from colored copy.

Duotype...Two halftone plates made from the same negative. One etched for detail (Key plate), the

other flat to print in light tint. Unless great care is used in printing, both plates being made from the same negative, a decided moire or screen pattern will result. A poor substitute for Duograph.

Duplicate Plates...Plates made from the same negative as the original plate. Etched and finished in the same manner.

Dye Print...A colored photographic print produced through superimposition of three (3) dyed colored separations. The color separations are produced photographically through the use of filters from the original color copy or subject.

Electrolytic Etching...Electrical decomposition of metal unprotected by the resist.

Electrotype...A plate made by electrolytically depositing metal—copper, nickel, etc.—on a mold of wax or metal taken from the original plate or wood cut.

Eleven Point Metal...Metal .152″ thick. Sometimes called heavy metal.

Ellipse...Denoting shape of printing surface of a plate. A regular oval.

Em...A printer's term denoting the square □ of any size of type. A twelve point em is one-sixth of an inch (or one pica) in width and depth. Ems are sometimes erroneously called "picas."

Embossing Plate...A plate cut or etched below its surface into which the paper is forced for the purpose of raising the image of the printed surface.

Emulsion...Trade term of sensitive collodion having silver salts in suspension.

Enamel...Carbonized glue or shellac acid resist.

Enamel...A sensitized coating flowed or spread on the surface of a metal plate to receive the image by light transference through a line or halftone negative. When developed and burned in, the enamel hardens into an acid resist protecting the image during the etching process.

Engrave...To cut, etch or incise a surface.

Engraver...Trade term employed to designate the artisans who execute the hand tool work on a plate. (See also Finisher.)

Engraving...Executing hand work on a plate; also a broad term for any form of printing plate produced by hand, photo-mechanical or etching process.

Enlargement...A reproduction larger than full size of copy.

Etched Depth...Distance measured vertically from flat printing surface to bottom of etched area.

Etching...Chemical or electrolytic disintegration of metal, also the trade name of a printing plate in which the picture or design in positive or negative form is incised by the action of acid. The process of corrosion or disintegration of metal when subjected to the action of an acid bath.

Etching Ink...An ink insoluble in water and containing ingredients which combine with powdered rosin to make an acid resist.

Etching Machine...Mechanically operated device to agitate etching acid and to distribute action evenly on face of plate.

Exposure...Subjecting a sentitized plate to the action of light. The duration of time of subjection.

Face...Denotes film side of negative or printing surface of plate.

"Fake" Process...An unfounded and obsolete term for halftones printed in two, three or four superimposed colors made from monochromatic copy with suitable screen angles, the colors being constructed by the photo-engraver to simulate effect of color separations.

Ferroplanics (trademark)...A duplicate original. The development by the U. S. Rubber Company of the so-called Ekko process, a patented method of electrodepositing iron to any thickness required. These precision printing plates are made available either in solid steel up to 16 gauge thickness for reproduction purposes or as job Ferroplanics for extremely long press runs.

Film...A thin body of collodion, gelatine or other substance generally employed as the vehicle for a sensitized photographic preparation. The photographic negative or positive.

Filter, Color...Transparent dyed colored substance either dry or liquid, for transmission of specific colors and absorption of others. Used in photography for color separation and for transmission of specific colors from copy to photographic plate.

Fine Line...A thin black finishing line enclosing the image on a plate. Also called hairline.

Fine White Line...A thin groove, tooled or etched into the printing surface of a plate. Also called hairline white.

Finish..Term used to designate treatment of outer edges of plate such as: square finish, hair line finish, vignetted finish, etc.

Finisher...The artisan who executes the final re-etching, engraving, tooling or burnishing preparatory to final proofing. Properly termed engraver.

Finishing...The final refinement of a printing plate and the removal of minor defects by hand tooling methods.

Finlay Process...The photograph is taken on a special panchromatic plate placed directly behind a "Taking Screen," composed of geometrically arranged red, green and blue-violet squares. Aside from increased exposure, it does not differ from regular photographic procedure. A contact positive is then made from the negative; when registered with a "Viewing Screen," somewhat similar to the "Taking Screen," the black and white positive creates the impression of an image in full color. Separation negatives are made from this positive (or color transparency) either in direct halftone (for photo-engraving) or in continuous tone (for litho or roto).

Fixing...Chemical removal of unexposed silver salts from developed photographic plate or print to

prevent further action of light thereon.

Flat...Trade name for metal or the glass on which a number of halftone or line negatives have been stripped or printed or etched. . . . A picture that is lacking in contrast or one that possesses a very narrow or limited range of tone values is called flat.

Flat Etching...The first period of etching on a halftone plate wherein the entire surface to be etched is submitted to the acid for a sufficient time to acquire the necessary "printing depth."

Flat Plate...Etched plate with poor contrast—opposite of Contrast.

Flat Proof...Proof made from finished or unfinished plate but without make ready of any kind.

Floating...A term used to express the handling and placing of photographic films when stripping.

Fluorescence Process (Kodak)... Color Separations from Fluorescent water color drawing. The Kodak fluorescent water colors fluoresce when exposed to ultraviolet light. The extent to which each color fluoresces has been established according to the relative amount of correction required by each color for accurate photomechanical reproduction. The greens, which require the greatest amount of correction, fluoresce the most brightly. This bright fluorescence registers as increased density in the green-filter ("red-printer") negative, so that the "red" is not permitted to print heavily enough to degrade green areas in the reproduction. The same principle applies to the corrections — the compensating of fluorescence — required for other colors. In using this palette of Kodak fluorescent colors, the artist works with no change in technique and with the assurance that his sketch will not present difficulties for reproduction. A Kodagraph copyboard hood with its filter panels provides the means for the engraver to obtain the required ultra-violet light from standard white-flame arcs.

Fluorographic Process...The preparation of paints by the artist, (black and white or color) diluted with a fluorographic solvent instead of by the use of water. Fluid contains chemicals which have an affinity for ultra violet ray. The parts of copy not treated with this solvent cause halftone dots to drop out automatically. Photographic exposures and an ultra violet transmitting filter play an equally important role in this process of highlighting.

Flush Blocking...Trimming mounted plate and block flush with printing surface.

Flush Trimming...Trimming unmounted plate flush with printing surface.

Focus...The point in the camera at which the converging rays of light passing through the lens from the original coincide to form a sharp image.

Four-Color Process Plates...Same as the three-color process with the addition of a gray or black plate.

Free Silver...Silver nitrate solution on surface of wet plate.

Frisket...A paper mask used to

cover up dead metal or bearers when proofing.

Fuzzy...The appearance of a proof due to a slurred impression. The appearance of a picture that lacks sharpness. The appearance of a halftone of irregularly etched dots.

Gallery...That part of an engraving plant used for making photographic negatives, etc. or its equipment.

Gamboge...A gum, soluble in water, used for stopping out areas on metal prints preparatory to laying tints.

Gelatinography...The process of printing from gelatin-relief plates.

Glue Top...The burned in enamel or acid resist on a plate.

Gouache...French word for a water color painting made with body color, and some kind of size or water soluble gum.

Grafa-Tone (screen)...Attractive and unconventional effects may be produced by use of this special screen. The irregular pattern facilitates halftone printing on rough papers.

Grain Box...A cabinet enclosing fine bitumen dust which, when agitated, and allowed to settle on the face of metal and burned in, forms a granular resist.

Grained Plate...A plate etched after having been coated with a granular resist.

Graphotype...An old process for rapidly producing plates for newspapers. (A) Plate covered with a layer of chalk or zinc oxide by hydraulic pressure, and a drawing made on this surface with a siliceous ink. When ink hardens the intermediate soft portions are brushed away leaving the design which may be stereotyped for printing or (B)—in which the design is scratched on a chalk coated plate and a mold made from the intaglio so produced.

Graver...Tool for doing engraving on a plate.

Gray...A term used to express the appearance of a picture lacking in brilliancy or rendered entirely in middle of low tone value.

Guide, Color...A sketch or color indication used when making color plate from uncolored copy.

Hairline...The finest line, either black or white, which can be etched or engraved on a relief plate.

Hairline Finish...A fine black finish line in contact with and bordering the edges of a square finished halftone.

Halftone...A relief photo-engraving, the negative for which has been made by photographing a copy through a halftone screen. Also, the printed impression from a plate so made.

Halftone Dot...An individual point of formation in negative or plate, characteristic of the halftone screen.

Halftone Negative...Photographic negative made by photographing a copy through a halftone screen.

Halftone, Outlined...A halftone with the background outside of the object entirely cut away, leaving a definite edge without shading or vignetting — a silhouettte.

Halftone, Outlined and Vignetted ...A halftone in which part of the background is cut away and part vignetted.

Halftone Plate...A relief plate made by a photo-mechanical etching process, employing the principle of the halftone screen, whereby all gradations of tone values in the copy are reproduced in the plate by variations in the formation and size of minute dots of geometrical arrangement obtained primarily in the negative by the interposition of a cross ruled screen.

Halftone Process...The method practised for production of halftone plates.

Halftone Screen...A grating of opaque lines on glass, crossing at right angles, producing transparent square apertures between intersections.

Halftone Square Plate...A halftone in which the outside edges are rectangular and parallel; may be with or without single black line border.

Halftone Tint Negative...Negative made by photographing one sheet of white paper through halftone screen.

Halftone Vignetted...A halftone on which one or more of the edges of the object are shaded from dark tones to pure white.

Hand Press...Proofing press operated by hand.

Hand Work...Tool work or extra etching, or any work done on copy, negative, print or plate by hand.

Hard Vignette...One not softened off to the point of invisibility, but exhibiting a delicate but definite printing edge.

Highlight...The light areas of a tone copy. The smaller disconnected dots of a halftone. Abbreviation for highlight halftone.

Highlight Halftone...A plate made from a halftone negative wherein the highlight dots have been so exposed and etched that they will not print on the metal.

Halftonometer...A device for measuring the depth between the dots of the printing surface of halftone plates.

Image...The picture of the copy shown on the ground glass; or the concrete reproduction of a copy on any medium.

Ink Cylinders...Press cylinders which, by their oscillating and rotating motion, help distribute the ink uniformly to the plate cylinder.

Insert...Term applied to an extra copy, also to negative therefrom when the latter is to be inserted into another negative before plate is printed and etched.

Inserting...The fitting of one negative into another or the assembling of a number into a definite relationship to each other by the accurate cutting and fitting of the photographic films. Usually wet plate films can be thus advantageously handled. Collodion emulsion films can be handled in like manner.

Intaglio...Countersunk or depressed image. Incised lines, instead of raised or in relief.

Intaglio Etching...Etching down the lines or dots in a plate instead of etching down the areas surrounding them. The resist for intaglio etching is printed from a positive instead of a negative.

Intaglio Print or Proof...Proof made from an intaglio etched plate, the ink being rolled into the etched lines or dots and wiped off the surface.

Isochromatic...Same as orthochromatic. Photographic emulsion sensitive to blue, green and yellow, but not to red.

Jig-Saw...A narrow thin saw blade, vertically mounted between the ends of two arms which move up and down reciprocally. Used for irregular sawing and for mortising blocked plates.

Joint...The line or point of contact between joined negative or plates.

Journeyman...Master craftsman who has served full period of apprenticeship.

Key Drawing...Copy composed of guide lines only.

Key Plate...The plate of maximum detail in a color set, to which other colors are registered.

Kill...To cancel, to discard, as to kill a plate.

Kromo-Lite...The spraying of copies with a chemical solution, before photographing, to increase highlighting. Much used in newspaper plants.

Laminated Wood...Blocking wood consisting of several thin layers of wood glued together with the grain crossing alternately.

Laying Tints...Trade term for printing Benday or similar tints on metal before etching.

Lens...An assembled arrangement of special glass segments ground and fitted together to form a complete unit. Used in photographic processes for the collection, direction and distribution of light rays.

Letterpress Printing...Letterpress machines are known as "*Platen*," "*Cylinder*" and "*Rotary*" presses.

Levy Screen...The halftone screen as developed and manufactured by Max Levy.

Light Absorption...The property of absorbing light or any of its component color waves.

Light Reflection...The property of reflecting light or any of its component color waves.

Line Copy...Any copy suitable for reproduction by a line plate. Any copy composed of lines or dots as distinguished from one composed of tones.

Line Drawing...A brush or pen drawing in which all elements are of full strength of the medium used. A drawing free from wash or diluted tones.

Line Engraving...A relief line plate produced from a copy without photographing it through a screen.

Line Etching...The process of etching a line engraving.

Line Negative...A negative made from a line copy and suitable for use in making a line plate. A negative of the same characteristics made from any copy, but without photographing through a halftone screen.

Line Plate...A line engraving.

Lining Beveler...Machine for beveling straight edges of plates with attachment for tooling straight white lines in borders of plates.

Logotype...The term sometimes used to designate the engraving or type used to reproduce the advertiser's name.

Lumiere...Contraction of "Lumière Autochrome." A photographic plate made by Lumière Frères for direct color photography.

Machine Etching...Applications of etching fluid to plate by mechanical means.

Magnesium Metal...An alloy which has recently been introduced for use in place of copper or zinc. Its extreme lightness makes it useful in some types of work. In printing and etching, the rapid action of the solutions and the absolute necessity for the absence of any foreign matter make it a problem in a production plant. Also its rapid rate of etching in nitric acid — approximately one-half the strength used for zinc — make it difficult to control. This must be overcome before it can replace copper or zinc to any degree.

Correction work in the form of soldering or tooling requires extreme care, and is not easily done. It is about 25% the weight of Zinc and has a fine grain structure. It is an extremely hard metal and will stand up under long runs on the printing press. Has great possibilities.

Magazine Standards...Individual specifications for the making of printing plates to conform to special printing requirements.

Make-Ready...The preparation and application of underlay or overlay for proofing or printing. Term for the sheet with complete underlays and overlays in position.

Masking...The operation of protecting or blocking out on a copy proof, plate or metal print a definitely outlined area.

Mats...Abbreviation for matrices. Composition, molds from relief plates, type or both, used largely in the newspaper field.

McKee Process...A method for varying the printing pressure on the different areas of an electrotype in relief printing, by bumping up the dark areas and lowering the light areas in the plate.

Metal Base or Blocking on Metal...Mounting a halftone, a line plate or an electrotype on metal type high.

Mezzograph...A photo-engraving made by photographing through a grain screen called a mezzograph screen.

Mezzotint...An impression from a plate characterized by an even gradation of tones, resembling those of a photograph. A hand process, in which the copper plate is indented or roughened and the effects produced by scraping, burnishing and rouletting.

Middle Tones...The various values of a copy ranging between highlights and shadows.

Milling...The mechanical operation of supplying a bevel to the edge of a rectangular or straight edged plate or routing away unwanted metal. (See "Beveling".)

Minimum...Size of plate, below which cost of manufacture remains fixed.

Moire...A formation of undesired symmetrical patterns produced by conflict between halftone screen and lines or dots of copy, as when making halftone from halftone proof or from steel engraving.

Monochrome...One color.

Mordant...An acid bath or corrosive liquid employed to etch metal.

Mortise...An enclosed aperture cut within area of plate or block into which other printing forms may be inserted.

Mosstypes...A plastic printing plate made from a plastic mold. They serve the function of electrotypes or stereotypes—are light in weight.

Mount...The base or block on which a plate is fastened to make it type high.

Nailing Machine...Mechanical device for nailing plate to blocks.

Negative...Reversal of values, the white being rendered black and vice versa. Also contraction of **Photography Negative.**

Negative Inserting...Combining negatives by inserting.

Negative Plate...A line or halftone plate which prints negative to copy, i.e., with reversed values. Such a plate is made by printing from a positive.

Negative Turning...Stripping and turning negatives over to reverse them.

Newstone...A halftone, 100-line or coarser, etched on zinc, usually for newspaper illustration, but often used in commercial work to be printed on cheap or rough papers.

Offset...A term used to designate a planographic printing process in which the impression, instead of being made directly, is first received by a rubber surfaced cylinder and then transferred from that cylinder to the paper.

Offsetting...When wet ink from a freshly printed sheet is transferred to the next one. This is termed offsetting.

One-Shot Camera (or Tri-Color Camera)...Three negatives are placed in camera at angles to one another and upon exposure three color separation negatives are produced simultaneously, one yellow, one red and one blue.

One-Way Screen...A halftone screen or plate having lines running in one direction only, not crossing.

Opaking...Protecting a photographic plate or transparent medium with a thin nonactinic coating through which light cannot penetrate.

Opaque...A water soluble paint used to block out areas on negatives to make them nontransparent.

Original...Term applied to copy of any kind.

Orthochromatic...Same as Isochromatic. Photographic emulsion sensitive to blue, green and yellow, but not red.

Outlined Halftone...A halftone from which screen surrounding any part of image has been cut away. A silhouette.

Outlining...Going around a cutout engraving with a No. 6 tint tool; it is done as a guide for the routers.

Over-Etched...A plate that has been submitted to the etching process beyond the normal period.

Overlay Negatives...Superimposing one negative upon another to obtain results unattainable by one negative.

Overlay in Proving...Built up or cutout sheets used to increase or decrease impressions on specific areas when printing. Placed under tympan sheet over plate.

Overlays...Part of make-ready always used in printing vignettes.

Painting In...The protection of definite areas of halftone or line plates by the application of acid resisting ink or varnish spread on with a brush.

Panchromatic...Sensitive to all colors.

Paragon Plates...Plates of rubber.

Patent Base...Metal, sectional blocks with means for holding plates for printing. Same as **Patent Blocks.**

Pattern...Term used to describe an engraving which will be used only for making electrotypes or other molded printing plates. . . . The checkboard, mottled, moire or watered silk effect produced in halftone reproductions from originals possessing screen or fine parallel ruled lines. Caused by the pattern of the copy crossing or interfering with the lines of the halftone screen.

Pen Drawing...Made by pen and India ink, in lines, dots or stipples, being a copy purely of black and white.

Photo...Abbreviation for Photograph.

Photo Electric Engraving (Fairchild)...New machine produces 65 screen plastic engravings directly from photographs rapidly and without chemicals. It produces plates from photographs up to 8x10 inches in from five to 25 minutes. The machine embodies a combination of electronic, electrical and mechanical components. At the present time these machines are leased at a monthly fee, and all servicing is taken care of directly by the manufacturer. Used by small out of town newspapers.

Photo-Engraving...An etched relief printing plate, in the making of which one or more negatives or positives have been used to produce the required acid resist.

Photogelatin...A screenless printing process that is ideal for facsimile reproduction of fine art and for commercial work having predominance of tone illustration. This process dates back to 1876 when Joseph Albert of Munich, Germany, experimented with sensitized gelatin on glass plates. A photogelatin printing plate today consists of a thin film of chemically treated gelatin which has been poured over a special metal plate. Continuous-tone negatives are transferred to the gelatin plate in the vacuum frame, and the finished print is an exact, continuous-tone duplication of the original subject reproduced. Rotaries

or flat-bed presses are used in printing.

Photograph...An image resulting from Photography.

Photographic Negative...An image of reversed values, resulting from photographic action of light, all whites being reproduced as blacks and vice versa.

Pin - Holes...Small holes in the negative caused by an over-iodized bath or very old collodion. Small holes in print or plate from any cause.

Plastic Plates...Duplicate plates that serve the function of electrotypes and stereotypes.

Plate...Any piece of metal bearing in relief or incised into its surface a picture, design or other device from which impressions are to be made by a printing operation.

Sensitized glass either wet or dry, used in the camera for photography. Also a printing plate.

Plate Cylinder...In a printing press, the cylinder on which the curved sterotype plate is mounted.

Plate Holder...Light-tight case for holding photographic plate in position on back of camera.

Plate Thickness...Backing up a halftone or line plate to the thickness of an electrotype. (0.152 inch.) Same as engraver's heavy metal (11 point).

Platen Press (Job Printing Press)...A platen press prints the entire area of a form in one flat squeeze. The form is on the back part, the platen is a flat steel slab at the front and the paper is placed in between. The platen is hinged on a heavy bearing and the squeeze is created by a pair of arms at the sides which pull the front and back sections together. Sheets are either hand fed into the press — or by means of automatic feeders.

Polychromatic...Many colors.

Positive...An image of the original object or copy corresponding to same in the scheme of light and shade. An image made by an exposure on a sensitized plate through a negative in contact.

Powdering...Application of rosinous powder to sides of relief areas of plate to protect them during further etching operations.

Press Proof (Cylinder)...A proof taken on such a press as the Claybourn, Hacker or the Vandercook. The impression is made by rolling contact of the plate and paper, instead of squeeze contact (like that on the Washington Hand Proof Press).

Printing...Making impression with inked plate or form, also the operation of making a photographic print or print on metal.

Printing Depth...The minimum depression in the etched portion of a photo-engraved plate necessary to insure a workable printing quality.

Process Color...Designates a method of color reproduction accomplished through color separations obtained by the use of color filters on a camera, as distinguished from mechanical means of color separations.

Progressive Proofs...A set of proofs of color plates showing

each color alone, as well as in combination with each succeeding color in printing rotation.

Proportion...The relationship existing between the different dimensions of a single object or copy, or the relationship existing between any dimension of object or copy and the corresponding dimension in enlarged or reduced size.

Proving or Proofing...Proving is taking an impression of the plate on paper, after plate has been inked up; a finished proof is one taken by overlay or underlay; a flat proof is taken of plate with all waste metal on.

Quadricolor...Four colors.

Quarter Tone...Term used in some localities for coarse screen plates made by enlarging from smaller halftones.

Reducing Glass...A double concave lens for viewing copies in reduced sizes.

Re-Etching... Supplementary etching to reduce areas of printing surfaces so they will print as a lighter tone.

The work following the flat etching of a halftone plate, consisting of staging and further etching of different areas of the plate to reduce the various tone values into proper conformity with the copy.

Register...Correct relative position of two or more colors when printed from color plates.

Register Marks...Guides on plates to aid in obtaining register during manufacture and proofing.

Relief Plate...Any plate for printing purposes in which the negative form of a picture is etched, cut or sunk into the plate resulting in the relief presentation of the picture in its positive form.

Reproduction...The process of duplication of pictures, etc., by photo-engraving methods. The product of the photo-engrvaing process.

Resist...Protective acid-proof coating covering printing area of plate and leaving parts to be etched exposed.

Retouching...Corrective treatment of negative, positive or copy by means of brush, pencil, pen, air brush or other means.

Reverse Plates...Plates which read backwards.

Rotary Press...A Rotary Press requires curved plates, either Electros or Stereos, which are clamped to the plate cylinders. These plate cylinders rotate against the *inking rollers* and then against the *impression* cylinders. The paper is fed between these rolls. These presses can run up to, or sometimes exceed 25,000, impressions per hour.

Roulette...An engraving tool containing a small wheel, called a knure, which is used to lighten shades in a *Relief* plate and darken parts of an *Intaglio* plate.

Rouletting...Indenting printing surface of a plate with a roulette to create or modify tone values.

Router...The machine on which the routing of a plate is accomplished by the high speed revolution of a cutting tool operating in

a movable spindle head. Also one who routs.

Routing...A mechanical means of removing the unessential metal or wood from any part of a printing plate, or lowering the surface of such parts that are not intended to be printed.

Rubber Plates...This type of plate is widely used in printing on such surfaces as *glassine, waxed paper, burlap, cloth, wood, bags, metal, foil, box covers, glass* and *paper.* There are two steps in reproduction. In the first, a matrix is molded from the form under heat and pressure. In the second, the flexible rubber plate is molded from the matrix. *Type, line drawings* and *about 85 screen* halftones are successfully reproduced. Rubber plates print well on rough surfaces and print solids satisfactorily, without mottling. Little ink is used. They permit a kiss impression and are good for high press speeds. They can be made from different rubber compounds, providing a variation from soft flexible sheets to hard plates, according to requirements. The form for a job to be rubber plated is prepared as for any electrotype job.

Saw Tooth Edge...Edge of halftone crossing screen line at angle, causing symmetry of dots to break into appearance of teeth of saw.

Scale...A rule of graduated dimensions. A schedule of rates or computations. A table of percentages. A ratio of enlargements or reductions.

Scanning (Color Separation)...A new electronic method of producing continuous tone separations.

Screen...The term used to denote the particular ruled screen to be used for halftone reproduction. Screens are ruled for practical purposes from 50 to 200 lines to an inch. The coarser rulings are used for plates to suit the conditions of newspaper printing, and the finer ones for the higher printing requirements. The numbers between are more generally employed to meet intermediate conditions. The character of the paper and press work, and to a certain extent the nature of the copy, determine the selection of the most suitable screen to be used in each instance.

Screen Angle...The angle at which two or more halftone screens are crossed to avoid a pattern as in color work.

Screened Line Plate...A plate made from pen drawing by imposing a screen before etching for the purpose of producing a tint effect. It has been found convenient to use the word "Skiagraph" to designate the result of stripping a halftone negative over a line negative and printing them on metal.

Screening...Stripping a halftone tint negative on a transparent area of another negative.

Set-Up...Negatives, whether all line or all halftone or both, stripped in a specified position.

Set-Up Double Print...To place negatives, generally a line and a halftone negative on separate glasses, with register marks on

each glass so that metal printer may photo-print both negatives on same piece of metal in position desired.

Shading Machine...Device for holding and adjusting position of shading films for laying tints on negatives or metal prints.

Shadow...The part of a picture obscured by lack of illumination. The darker areas of any copy.

Sharpness...The clear, well defined appearance of the image or picture.

Shell (electrotype)...An electrotype shell is a duplication of the original from which a mold was made, but the back is rough and the shell too thin and fragile to be used for printing, so that it is necessary that it be *backed up.*

Shoulder...The projecting ledge on an etched plate created by four-way powdering after the first bite. Any similar projection below printing surface.

Silhouette...A halftone from which screen surrounding any part of image has been cut away or etched away.

Silhouette Finish...A halftone with all background surrounding an illustration of simple contour removed from the plate.

Silk Screen Process . . . This *short run* process is rapidly becoming one of the most important among the graphic arts. It is about 25 years old, and too little is known about its scope and limitations. Mechanical presses and the rapid drying of prints may soon facilitate long runs.

Silk screen work is a *stencil* process of *painting.* The screen supports the stencil and its open spaces allow the *paint* or *silk screen ink* to be squeezed through them by the use of a "*squeegee.*" With hand-cut films, corrections on a finished screen are feasible, but should be avoided whenever possible. On photographic silk screen stencils, corrections cannot be made once they are completed. Halftones can be made in silk screen, but it is not advisable to make them finer than 80 lines per inch. Original copy for photographic stencils should have very sharp outlines and must be very well prepared. With hand cut film, the *tracer,* known as the film cutter, can work from pencil sketches and can finish art work while cutting film.

Production volume varies not only with the size of the sheet but also with the amount of *detail* of the screen—and the kind of *paint* or *ink* employed plus the *stock* to be used. It is quite low when compared to any mechanical printing process.

Silver Print...Photographic print on paper which has been sensitized with silver chloride salts.

Silvertype...A patented stereotype plate that is made from the specially prepared silvertone mat. The mat is immersed in a conditioning solution that makes it flexible and rubbery with a smooth glass-like face, free of grain marks.

Sketch...Usually is made in a rough, quick way with a pencil, crayon or brush, to suggest the composition or style of a prospec-

tive drawing, to be completed later. A sketch (or "layout") is a preliminary to a drawing, and is rarely, if ever, reproduced direct.

Slug...Engravers term for a hole or scratch in a negative.

Slurred...An impression that is imperfect due to indirect pressure.

Snappy...A term describing a brilliant picture of wide contrasts and wealth of middle tones.

Spotting...Removing black or white spots on plate.

Squared...Designing shape of halftones, all four sides of which can be beveled in straight lines.

Square Finish...A halftone with an unbroken screen surface finished in rectangular shape with or without border line.

Staging...Protecting by the application of asphaltum varnish or other resist such area of a plate requiring no further re-etching, leaving those parts of the plate surfaces exposed which require additional treatment.

Stain...Image formed by discoloration on copper or zinc print by short immersion in weak acid or alum bath.

Stain Print...A print on metal from either halftone or line negative immersed in acid for an interval just sufficient to stain the exposed surface. When the print is washed off a distinct image is shown by the contrast between the stained and unstained parts. Stain prints are used as the guide for the laying of the Benday or solid tints for color plates.

Stamping Die...A relief plate engraved or cut on brass or zinc for stamping book covers or similar surfaces.

Steel Engraving...A steel engraving is commonly used for printing *stock certificates, postage stamps, paper money* and *bonds.* These plates are hand engraved or cut by geometric lathes. This is intaglio printing.

Step and Repeat...Special equipment used for the speedy and economical production of multiple images of a single subject, adaptable to all reproduction processes.

Stereotype...A plate made by casting metal into a matrix, used generally for newspaper and inexpensive forms of printing.

Stipple...Generally used in a collective sense to designate any arrangement of dots of regular or irregular formation.

Stopping Out...Covering areas on a negative with opaque to prevent light action or covering areas on a plate with resist to prevent acid action.

Stripfilm...This film is coated with process emulsions and comes in rolls or in sheets of various sizes. It was originally intended for newspaper engraving plants, but today strip-film is very much used in commercial plants for *line* and *halftone work* as well as for *color reproduction.* Can be purchased from Kodak, Ansco, Chemco, DuPont, Ilford and others.

Stripping...Removing negative or positive film from glass preparatory to turning and inserting.

Surprint...A print from a second negative superimposed in a defi-

nite position upon the print of the first negative.

Sweating...Soldering a metal printing plate to a metal base by the use of solder foil, heat and pressure.

Tempera...The oldest method of artistic painting. Probably evolved from a primitive method in distemper. True tempera is painted upon canvas, wood or other surface prepared with coatings of gesso, a mixture of slaked plaster of Paris, pure dry zinc white and fine whiting, (or the whiting alone), with a thin size made of fine acid-free glue. The colors are usually mixed with a medium composed of egg-yolk or egg-white, or casein and body white is freely used. Tempera paintings have a mat surface, unless they are varnished in which case they look like oil paintings.

Three-Color Process Plates... Printing plates produced from colored copy, or objects, to reproduce the picture or objects in their original colors by a photochemical separation of the primary colors, and etched halftone plates to reproduce each separate color, usually printed in yellow, red and blue.

Three or More Color Halftones Same as definition of two-color halftone, using three or more etched halftone plates.

Tint...A reduction of a solid color.

Tint Block...A solid or screened plate to be used in printing a flat color.

Tint Laying...The operation of transferring Benday tints to plates, drawings or other mediums.

Tint Plate...An area of screen, stipple, ruling or other patterns of an open nature.

Tintype...A ferrotype or photograph on sheet iron.

Tooling...Engraving white lines with a graver.

Top...Acid resist on a metal plate preparatory to etching.

Topping Powder...White rosin used to create acid resist on an inked albumen print.

Totalume...An all-electronic light totalizer designed to insure uniform high negative quality work in color process and halftone work. It permits repeated exposures resulting in identical density ranges or absolute densities within a plus or minus .02. The instrument measures exposures in light units instead of seconds. (Universal Match Corporation. St. Louis.)

Transfer...Ink impression on celluloid, from etched plate used to make a duplicate impression on another plate.

Transfer Ink...An ink containing grease, wax and asphalt, used in transferring.

Transparent Proof...Proof on transparent paper.

Trichromatic...Three colors.

Trimming...Tooling off projecting ledge below printing surface of etched plate. Milling side of blocks.

Tritone Process...A patented process by which reproductions give three tone effects. Requires special camera and developing techniques.

Two-Color Process Plates...Two halftone plates made at different screen angles from colored copy by the photo-mechanical separation of colors. Also called duotone.

Type-High...0.9186 of an inch. A plate is said to be "Type-High" when it is mounted on wood or metal to the proper height to be used on a printing press.

Undercut...The lateral etching of the lines or dots in a line or halftone plate below the printing surface.

Underlay...Built up or cut out sheets placed under plate to increase or decrease impression on special areas when printing.

Upham Attachment...A flat-bed press with plate cylinder under feed board contacting with impression cylinder.

Plates are curved by a process in which elongation is eliminated.

Velox Print...Name for one of the chloride printing papers made by the Eastman Kodak Co. and sometimes erroneously used as name for similar developing papers.

Vinylite...Hot plastic molding in Vinylite sheets was introduced in the United States in 1942 by Printing Plates Research, Inc. This plastic sheet and subject to be molded are heated to about 220 degrees F, a resilient backing placed on the back of the plastic and the assembly placed between the cold platens of a molding press. In making the Vinylite mold relatively little squeeze is necessary and this is because the material is hot when pressure is applied. After molding, the assembly is removed from the press and cooled under lighter pressure, then the mold is removed and the surface is rendered electrically conductive by silvering. Type and printing plates can be locked up together and molded at one time in Vinylite.

Vignette...A gradually shaded off edge, from dark to light, as on a photograph or engraving.

A halftone with the background setting blending into an invisible finish, due to the gradual reduction in the size of the dots of the background as they approach the printing edges.

Vivex Process...A carbon color process readily linked with offset and particularly with gravure, eliminating most of the retouching. A color proof can be shown before etching and the process is very much simplified. Much in use in Europe.

Wash Drawing...Made by a brush in washes with a single pigment of black or dark color soluble in water, to be reproduced by the halftone process.

Water Color Drawing...Same as above, made in washes with a combination of several colors. Reproductions may be by process color halftone plates or by redrawing and by combination of halftone with Benday line plates.

Wet Plate...Collodionized glass plate sensitized with silver nitrate and exposed while wet.

Wet Printing...A term applied to one color following another immediately in printing color plates, i.e., one impression is made upon

another before the ink has time to dry.

Plates should be adapted to this method of printing whenever information is furnished as to such requirements.

Wood Base...Wooden block used for mounting printing plates.

Wood Engraving...A printing plate in which the illustration is photographed or drawn on boxwood and engraved entirely by hand.

Working Drawing...A perfected drawing of a preliminary sketch made for the purpose of reproduction.

Zinc...Metal used in Etching department. Abbreviation for zinc etching of line plate.

Zinc Etching...A photo-engraved line plate on zinc. Action of acid on zinc.

Zinc Halftone...Halftone plate etched on zinc.

Zinc Print...Photographic acid resist photo printed on zinc.

Trifles make perfection, and
perfection is no trifle.

—MICHELANGELO

INDEX

Aberration, 71
Achromatic, 71
Acid blast etching, 71
Acid resist, 8, 87; use of, 5f.; topping powder, 90
Acids, use of, 56, 57
Actinic rays, 71
Airbrush, 59, 71
Anchoring, 71
Aquarelle, 71
Aquatint, 71
Aquatone, 71
Artotype, 71f.
Art Subjects, reproduction in aquatone, 71
Asphaltum, in staging, 89
Autochrome, 72

Bac-etch, 72
Background, 12; changing tonal value of, 59
Backing-up, 72
Base, *see* Block
Bassani, 72
Bearers, 72
Bed printing, *il.*, 37
Benday line etching, *il.*, 49
Benday plates, 59f., 72
Benday process, 13, 72; *il.*, 47, 68; laying tints, 82
Benday tints, 50; *il.*, 49
Bennett, James Gordon, 3
Berchtold, 5
Bevel, 72
Beveled plate, 53
Beveling, 72; *il.*, 36; lining beveler, 83; milling, 83f.
Bierstad, Edward, 3
Bite, 72, 75
Black, 43, 45
Black and white, 72
Black plates, in color printing, 46
Bleach print, 72
Bleeding, 67, 72
Block, 72
Blocked plate, 53
Blocking, 8, 10, 66, 72; *ils.*, 34ff., 69; flush, 79; metal base, 83
Blow-up, 72
Blue (or violet), 14, 43, 45, 47
Blue print, 72f.
Border, 72
Bourges shading sheets, 73
Brass, 73
Bromide paper, 7
Bullock, E. and J., 3
Bullock, Swan, and Avet, 5
Burr, 73

Cabro prints, 44
Camera, 73; one-shot, 84
Carbon process, 73
Cast, 72

Cellograph, 73
Cerography, 73
Chalcographer, 73
Chalk, 73
Chalking, *il.*, 40
Charcoal drawing, best medium for reproduction, 61
Cherry wood, kiln dried, 10
Chewed, 73
Chloride paper, 7
Chromatic, 73
Chromatone process, 73
Chromium, 53
Chromium plated, 73f.
Circle, 74
Cleaning, *ils.*, 42
Cliché, 74
Coated paper, 9, 66, 74
Cold enamel, 74
Collodion, 7, 44, 74; use of, *il.*, 20
Collodion plate, 13
Color, complementary, 44, 75
Colors, primary, 13, 44, 47
Color artists, 74
Color filter, 74
Colorgravure, 74
Color proofs, progressive, 74
Color printing, 64; steps in process, 13ff.;
register, *il.*, 42;
filters, 43;
chromatone process, 73;
"fake" process, 78;
fluorescence process, 79;
four color process, 79;
process color, 86;
three-color process, 90
Color separation, 13f., 44, 74; guide lines, 67;
scanning, 88;
see also D print
Color work, 74
Combination halftone, 13, 61
Comination line and halftone, *il.*, 48
Combination plates, 64, 75
Compensators, 75
Connected dot, 75
Continuous tone method, in color separation, 14, 44;
negative, 75
Contrasts, 75; snappy, 89;
see also Flat plate
Copper etching, 75; *ils.*, 30ff.
Copper, sheet, use for halftones, 7f.
Copper plate, use with bichromated gelatine, 2
Copper printing, 75
Copper shell, 53
Copy, 75; preparation of, to insure good reproduction, 58 ff.;
things to avoid, 64;
kinds of, and best medium for reproduction, 61 ff.
C.P., 73
Crayon drawing, best medium for reproduction, 61
Cromalite, *see* Kromo-Lite
Crop, 75
Cross-hatch, 75
Cross line screen, 75
Curved plate, 53, 75
Cut, 75
Cylinder, 57
Cylinder press, 75

Daguerre, Louis J. M., 2
Dead metal, 75; bearers, 72
Deep etch, 75
Depth, 33;
printing, 86
Detail, 75
Development, of photographic plate, 7f.
Digging out, 75
Dimension marks, 62, 76
Direct method, 44; in color separation, 13f.
Distemper, 76
Doctor blade, 57

Dots, 80; in halftones, 8 ff., 76;
types of, *il.*, 11;
number of, 66;
connected, 75
Double print, 76; set-up, 88
Dragon's Blood, 8, 76
Drawing, or copy, 76
Dropout, 76;
il., 49
Dropout halftones, 64;
dry brush, 76
Dry plate, 76; *see also* Stripfilm
Dry plate emulsion, 44
Dry point, 76
Duograph, 76
Duogravure, 76
Duotone, 76, 91
Duotype, 76f.
Duplicate plates, 77
Dye print, 76

Eggloffstein, 5
Electrolytic etching, 76
Electrotype, 77; loss of depth, 11f.;
il., 54;
McKee process, 83;
shell, 88
Electrotyping, 52 ff.
Eleven-point metal, 77; plate thickness, 86
Ellipse, 77
Em, 77
Embossing plate, 77
Emulsion, 44, 77
Enamel, 77; cold, 74
Engraving, 57, 77; early forms of, 1;
reproduction, 61;
photo-electric, 85
Engraving plant, *ils.*, 68f.
Enlargements, 66, 77; showing screen structure, 46;
see also Blow-up
Etched depth, 77
Etching, 1, 77; process of, 8, 57;
il., 69;
on zinc, *ils.*, 26ff.;
on copper, *ils.*, 30ff.;
flat, 79;
machine, 83;
over-etching, 85;
re-etching, 87;
see also Dry point
Exposure, 78; of colored copy, 44

Face, 78
Ferroplanics, 78
Film, 78
Filter, 60; use of, in color printing, 14, 43, 74, 78
Fine line, 78
Fine white line, 78
Finish, 78
Finishing, 8, 10, 44, 53, 78; *ils.*, 38ff., 68
Finlay process, 78
Fixing, 78f.
Flat, 7, 79; *il.*, 32
Flat etching, 79
Flat plate, 79
Flat proof, 79
Floating, 79
Fluorescence process (Kodak), 79
Fluorographic process, 79
Flush blocking, 79
Flush trimming, 79
Focus, of lines and colors, 71, 79
Folio proofs, 64
Four-color process plates, 79
Free silver, 79
Frisket, 79f.
Fuzzy proof, 80

Gallery, 80; *il.*, 69
Gambage, 80
Gamble, William, 5
Gelatine, bichromated, use of, 2;
use as filter, 14;
sensitized, 57;
in carbon process, 73
Gelatinography, 80

Glass, etched lines on, as early screen, 3f.; *il.*, 20
Glass flat, 7
Glue top, 80
Gouache, 80
Grafa-tone, 80
Grain box, 80
Grained plate, 80
Graining, 71
Graphotype, 80
Graver, 80
Gray, 80
Gray down, 60; *il.*, 49
Grease pencils, use of, 60
Green, 43; as filter, 14
Groesbeck, Harry, ix
Guide, color, 80
Guide lines, 67

Hairline, 12, 80
Hairline finish, 80
Halftone, earliest use of word, 3; method perfected for commercial production, 4; pioneers in method of production, 5f.; definition, 8, 80f.; cause of imperfections in, 10ff.; standard depths for, 12; variations in types, 12f.; *ils.*, 48, 56; copy suitable for, 61; reprint from, 61; blow-up, 72; three or more colors, 90
Halftonometer, 81
Hand press, 81
Hand work, 81
Heavy metal, *see* Eleven-point metal
Heliography, 2
Highlight, 81; process in Kemart, 60
Highlight halftone, 12f.; *il.*, 49
Highlight negative, *see* Dropout negative
Hoe, rotary press, 3
Horgran, Stephen Henry, 3, 5

Image, 81
Indirect method, in color separation, 13f., 44
Indirect halftone, *il.*, 49
Ink, specified to printer, 15, 45; etching, 77
Ink cylinders, 81
Inking roller, 56
Insert, 81
Inserting, 81
Intaglio, 3, 81f.; copper printing, 75
Intaglio printing, 57f.
Iron-perchloride, 32
Isochromatic, 82
Ives, Frederick, 3, 5; first ruled screen, 4

Jig saw, 82
Job printing press, *see* Platen press
Joint, 82
Journeyman, 82

Kemart, 60
Key drawing, 82
Key plate, 82
Kill, 82
Kossuth, 5
Kromo-lite, 82

Laminated wood, 82
Laying tints, 82
Lead mold, 52f.
Leggo, 5
Lens, 82
Letterpress, 56, 82
Levy screen, 4, 82
Light absorption, 82
Light reflection, 82
Line copy, 82
Line cut, dry brush drawing, 76; *see also* Line-etching
Line drawing, 82; best medium for reproduction, 61

Line engraving, 82
Line-etching or line-cut, 6f., 82; *il.*, 49;
copy suitable for, 61;
reprint from, 61
Line negative, 50, 82
Line plate, 82; screened, 88
Line screen, Talbot's forerunner of, 2
Lining beveler, 83
Lithograph, best medium of reproduction, 61
Lithography, 57, 71
Logotype, 83
Lumiere, 83

Machine etching, 83
Machine-finished paper, 9
McKee process, 83
Magazines, 67
Magnesia, 32
Magnesium metal, 83
Makeovers, 64
Make-ready, 83
Maps, reproduction, 61
Masking, 83
Mats, 54, 83
Measuring for reproduction, 63, 66; *see also* Dimension marks
Medium, light, sensitive, 1
Meisenbach, 5
Metal, printing on, 7f.; *ils.*, 22ff.
Metal base, 83
Metal plates, 44; use of in first photo-engraving, 2
Mezzograph, 83
Mezzotint, 83
Middle tones, 83
Milling, 83f.
Minimum, 84
Moire, 14, 43, 84
Mold, in electrotyping, 52; *see also* Cast
Montage, 66f.
Mordant, 84
Mortise, 84
Mortising, *il.*, 37
Mosstypes, 84
Mount, 84

Nailing machine, 84
Negative, 84; treatment of, 10;
for combination halftone, 13;
in color printing, 15;
processed, *il.*, 24;
wet plate, 63;
photographic, 85
Negative turning, 6f., 84
Newspaper, first halftone, 3;
size of screen for reproduction in, 63
Newsprint, 9
Newstone, 84
New York *Herald*, 3
New York *Tribune*, first photographic reproduction, 3f.
Nickel shell, 53
Nickeltypes, 11
Niepce, Joseph Nicephore, method of photo-engraving, 1f.
Niepce, St. Victor, 2
Nitric acid bath, 8
No line, 12; *il.*, 48

Offset, 56f., 71, 84
Offsetting, 84
Oil paintings, best medium of reproduction, 61
One-shot camera, 84
One-way screen, 84
Opaking, 84
Opaque, 84
Optak, *see* Aquatone
Orange (or red), filter, 14, 43
Original, 84; *see also* Copy
Orthochromatic, 84
Outlined halftone, 84
Outlining, 85
Overlay, 85; *il.*, 42
Overprinting, 46

Overtime charges, 64

Painting, reproduced by halftone, 6
Painting in, 85
Panchromatic, 85
Paper, type of, and size of dots, 8ff.;
  kinds of, 66
Patent base or blocks, 85
Pattern, 85
Pen and ink drawing, 6;
  reproduction, *il.*, 47;
  preparation for reproduction, 59f.
Pencil drawing, best medium for reproduction, 61
Pen drawings, 85; bleach print, 72
Petit, 5
Pewter plate, early example of etching on, 2
Photo-electric engraing (Fairchild), 85
Photoengraving, defined, viii, 5, 85;
  value and uses of, viii-ix;
  steps in modern process of, 6ff.;
  contributions of modern research, 15f.;
  photography, 18ff.
Photograph, first newspaper reproduction, 4;
  halftone reproduction of, 6;
  with and without halftone screen, 50;
  best medium for reproduction, 61;
  clean copy, 62;
  damaged in handling, 66;
  mailing instructions, 67
Photographic negative, 85
Photographic paper, use of, 7
Photographing, *ils.*, 18 ff.
Photography, production of engraved steel plates by, 2
Photogravure, 57
Photostat reproduction, 61
Pin holes, 86
Planographic printing, 56f.
Plastic mold, 53
Plastic plates, 86
Plate, 86;
  over-underlaid, 11;
  for color printing, 13f.;
  types of, 53
Plate cylinder, 86
Plate thickness, 86
Platen press, 86
Platt, Thomas C., 4
Positives, 44, 66, 86
Powdering, 86
Press cylinder, 57; over-packing, **11**;
  see also Ink cylinders
Press proof, 86
Printed matter, reproduction, 61
Printing, 86; by wood blocks, 1;
  ils., 22 ff., 68
Process color, 86
Process plates, 14, 44
Progressive proofs, 15, 45, 86f.
Proof, fuzzy, 80
Proofing, 87;
  ils., 38ff., 69;
  press, *il;* 42;
  stock for, 63
Proofing plates, 46
Proofs, progressive, 15, 86;
  in color printing, *ils.*, 45
Proportion, 87
Proving, 87

Quadricolor, 87
Quarter tone, 87;
  il., 49

Raised surface printing, 56
Red (or orange),
  filter, 14, 43, 45, 47
Reducing glass, 87
Reductions, 66
Re-etching, 87; *il.*, 33
Register, 72, 87
Reid, Whitelaw, 3
Relief plate, 87
Relief printing, 56

Repairs, 63
Reproduction, 87; preparation of copy for, 58ff.
Resist, 87; staging, 89
Retouching, 58, 87;
il., 32;
proper color of pigment, 66
Reverse, 66
Reverse plates, 87
Rotary press, 3, 87
Rotogravure, 57f.; carbon process, 73
colorgravure, 74
Roulette, 87
Router, 87
Routing, 8, 16, 88;
ils., 34ff., 69
Rubber cement, 7
Rubber plates, 88

Saw-tooth edge, 88
Scale, 88
Scanning, 88
Scraper board, best medium for reproduction, 61
Scratches, repaired, *il.*, 41
Screen, use of in halftones, 3ff., 44, 50, 81;
first ruled, on glass, 4;
early improvements in use of, 5f.;
range of, 6;
size of, with different types of paper, 10, 46, 63, 66, 71, 88;
angles, 14f., 43, 88;
cross line, 75;
grafa-tone, 80;
Levy, 82;
one-way, 84
Screened line plate, 88
Screening, 88
Sensitizer, 7
Set-up, 88
Shading machine, 89
Shadow, 89
Sharpness, 89
Shell, electrotype, 89
Shoulder, 89
Silhouette, 58, 89
Silhouette halftone, 12, 84;
il., 48;
vignette, *il.*, 48
Silver nitrate, use of, *il.*, 20
Silver print, 89
Silvertype, 89
Sketch, 89f.
Slug, 90
Slurred, 90
Snappy, 90
Spotting, 90; *il.*, 32
Square halftone, 12
Squared, 90
Square finish, 90
Square plate, halftone, 81
Squaring, *il.*, 37, 40
Staging, 90; *ils.*, 33
Staging in, 15
Stain, 90
Stain print, 90
Stamping die, 90
Steel engraving, 90; best medium of reproduction, 61
Step and repeat, 90
Stereotype, 54, 90;
cliché, 74;
silvertype, 89
Stereotype plates, 3f.
Stipple, 90
Stopping out, 90
Strip film, 6, 20, 24, 44, 90
Stripping, 90;
ils., 22ff., 69;
collodion, 74
Subsurface printing, 57f.
Super-calendered paper, 9
Surface printing, 56f.
Surprinting, process, 50
Surprints, 64, 90f.
Sweating, 91

Talbot, W. H., Fox 2, 5

Tempera, 91
Tenaplate mold, 52
Three-color process plates, 91
Tint, 91
Tint block, 91
Tint laying, 91
Tint plate, 91
Tintype, 91
Tonal charts, 47, 49
Tonal values, 10, 33;
  burnishing to increase, *il.*, 41;
  in indirect method, 44;
  in color printing, 46;
  in background, 59;
  contrast in, 75
Tooling, 91
Top, 91
Topping powder, 28
Topping powder, 91
Totalume, 91
Transfer, 91
Transfer ink, 91
Transparencies, color, 44
Transparent proof, 91
Trichromatic, 91
Trimming, 91; *il.*, 40
Tritone process, 91
Two-color process plates, 92
Type high, 36, 37, 92
Type page, 6;
  reproduction, 61

Ultraviolet light, 60
Undercut, 92
Undercutting, result of, 8
Underlay, 92
Upham attachment, 92

Vacuum frame, 7
Velox print, 92
Vignette, 81, 92;
  re-etching, *il.*, 33
Vignette halftone, 12
Vinylite, 92
Vinylite mold, 52
Violet (or blue),
  filters, 14, 43
Visiting cards, copper printing, 75
Vivex process, 92

Wash drawing, 13, 92; reproduction, 6; *il.*, 47;
  best medium for reproduction, 61
Water color drawing, 6, 92;
  best medium for reproduction, 61;
  see also Aquarelle
Wax engravings, 53;
  see also Cerography
Wax mold, 52
Web press, 4
Wedding invitations, copper printing, 75
Wet plate, 6; silver, 44;
  negatives, 63
Wet printing, 43, 92f.
White line, *il.*, 41; fine, 78
Wood base, 93
Wood blocks, 1
Wood block, 1; trimmed, *il.*, 37
Woodbury, 5
Wood engraving, 6, 93; reprint from, 61
Working drawing, 93

Yellow, 43, 44, 45, 47;
  as filter in Kemart process, 60

Zinc, 93; sheet, use in line work, 7f.
Zinc cuts, *il.*, 41
Zinc etching, 93; *ils.*, 26ff.
Zinc halftone, 93
Zinc plates, 64
Zinc print, 93

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